DOCUMENT RESUME

ED 247 080 SE 039 713

AUTHOR	Helgeson, Stanley, Comp.; And Others
TITLE	Especially for Teachers: Selected Documents on the Teaching of Science 1966-1981.
INSTITUTION	ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Columbus, Ohio.
SPONS AGENCY	National Inst. of Education (ED), Washington, DC.
PUB DATE	Dec 82
CONTRACT	400-78-0004
NOTE	283p.; Portions of subject index may be marginally legible due to light print.
AVAILABLE FROM	SMEAC Information Reference Center, The Ohio State Univ., 1200 Chambers Rd., Rm. 310, Columbus, OH 43212 ($10.00).
PUB TYPE	Reference Materials - Bibliographies (131) -- /ConInformation Analyses - ERIC Information Analysis Produc
EDRS PRICE	MF01/PC12 Plus Postage.
DESCRIPTORS	Biological Sciences; Curriculum Guides; *Elementary School Science; Elementary Secondary Education; Exceptional Persons; *Instructional Materials; Interdisciplinary Approach; Physical Sciences; *Resource Materials; *Science Activities; Science Careers; Science Education; Science Instruction; *Secondary School Science; Teacher Education; *Teaching Methods

ABSTRACT

Designed to supplement the day-to-day planning, teaching, and evaluation activities of science teachers at all educational levels, this compilation contains over 900 resumes of practitioner-oriented documents announced in "Resources in Education" (RIE) between 1966 and 1981. The resumes are presented under these headings: (1) elementary (biology/life science, careers, curriculum, earth/space/meteorology/oceanography, energy, multiple areas, physical sciences); (2) secondary (biology, careers, chemistry, earth/space/meteorology/oceanography, multidisciplinary, physics/physical science); (3) K-12 exceptional (including materials for handicapped and gifted students); and (4) various K-12 subjects. A list of documents by ED number, an author index, and a subject index (using terms from the "Thesaurus of ERIC Descriptors") are included. (JN)

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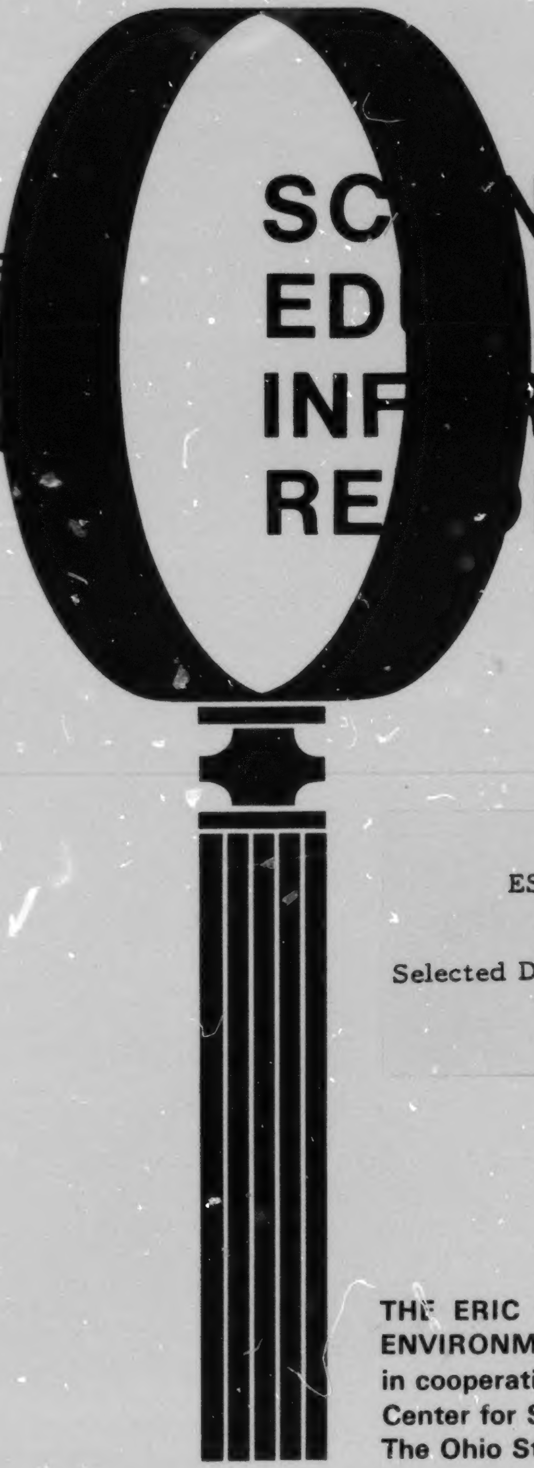

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Selected Documents on the Teaching of Science

1966 - 1981

THE ERIC SCIENCE, MATHEMATICS AND
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ESPECIALLY FOR TEACHERS:

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Selected Documents on the Teaching of Science

1966 - 1981

December, 1982

Especially for Teachers:

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Selected Documents on the Teaching of Science 1966-81

Compiled by
Stanley Helgeson
Patricia Blosser
and
Robert W. Howe

December, 1982

Produced by the ERIC Clearinghouse on Science, Mathematics, and Environmental Education and the SMEAC Information Reference Center (The Ohio State University). The publication is available in paper copy from the SMEAC Information Reference Center for $10.00. Discounts are available on volume purchases.

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This publication was prepared with funding from the National Institute of Education, U.S. Department of Education under contract no. 400-78-0004. The opinions expressed in this report do not necessarily reflect the positions or policies of NIE or U.S. Department of Education.

Note

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If you have comments on this or any other ERIC/SMEAC publication, please send them to us. We appreciate the past comments we've received.

Robert W. Howe
Director
ERIC/SMEAC

Staff work for this document was completed by
Mrs. Linda Shinn and Ms. Rene' Moore.

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INTRODUCTION

Try as they might, classroom teachers often do not have enough information at their fingertips to revitalize their lesson plans. They feel the urge to stimulate student learning with fresh teaching approaches, but they wonder how and where they can find the information. They need ready references without having to buy all the "how-to" books on the market. The ERIC database has responded to these needs for many years, offering access to the shared secrets of teachers, administrators, and educational researchers. Now, as part of a systemwide effort to provide information analysis products of current interest to particular users, the ERIC Clearinghouse for Science, Mathematics, and Environmental Education offers this compilation of teaching materials for science instruction.

Designed to supplement the day-to-day planning, teaching, and evaluation activities of science teachers at all educational levels, this compilation contains over 900 citations chosen after careful review of documents that appeared in Resources in Education from 1966 to 1981. Annotations of articles from the Current Index to Journals in Education were not included. Since a document's selection for this bibliography was made on the basis of timeliness, teacher orientation, and nonrepetitiveness in relation to the other 3,000 documents reviewed, the omission of a document is not to be taken as a judgment of its quality. For the purposes of this bibliography, the term "teacher" represents both parents as the teachers of their preschool children and instructors of adults, young adults, children, and adolescents.

The classification scheme reflected in the Table of Contents, developed from staff recommendations and interviews with teachers, indicates the range of the ERIC database and the nature of the materials in the database. An index using terms from the ERIC Thesaurus of Descriptors provides another avenue of approach to the literature.

Knowing the diversity of teaching styles and teachers' wide-ranging interests and activities, we urge satisfied users of this compilation to return to the ERIC database for additional ideas.

AVAILABILITY OF DOCUMENTS

Copies of most documents announced in this index can be read in their entirety on microfiche reader/printers at any one of the 700 libraries or institutions that subscribe to the ERIC Microfiche Collection. If the author or corporate source of the document did not give permission for the document to be included in the ERIC Microfiche Collection, another source of availability will be noted in the citation. A mark (#) appears after ED numbers in the subject index for items that are not in microfiche. For a complete listing of ERIC Microfiche Collections in your area, call or write to the ERIC Clearinghouse for Science, Mathematics, and Environmental Education, 1200 Chambers Road, Rm. 310, Columbus, OH 43212 (614-422-6717).

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ED 198 011 SE 034 398

Mouldin, Lundie Frankenberg, Dirk

North Carolina Marine Education Manual, Unit Two: Seawater.

North Carolina State Univ., Raleigh. Sea Grant Coll.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.

Report No.—UNC-SG-78-14-B

Pub Date—Aug 78

Grant—NOAA-04-6-158-44054

Note—90p.; For related documents, see SE 034 397-401.

Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($1.50).

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC04 Plus Postage.

Descriptors—*Earth Science, Environmental Education, Geology, Junior High Schools, *Oceanography, Physics, *Science Education, Science Instruction, Secondary Education, *Secondary School Science, *Water Resources

Identifiers—Coastal Zones, Waves

Although North Carolina's coastal water is chemically and physically similar to other bodies of sea water, the specific manner in which tides and waves act upon the coastline is unique. Accordingly, the 30 activities presented in this manual are intended to help junior high school students understand how physical forces modify coastal areas. While some lessons relate specifically to North Carolina, the majority address more general concepts of salinity, density, nutrient content, tidal forces, and wave motion. Each section contains background reading, vocabulary, 4 to 14 activities, and information on films, books, and other related resources. Also provided are a table depicting the relationship between the activities and state curriculum guidelines, and a summary of this unit's goals and behavioral objectives. The manual is one of a collection developed by North Carolina teachers and university faculty under a Sea Grant project entitled "Man and the Seacoast." (WB)

Clearinghouse Accession Number.

Sponsoring Agency—agency responsible for initiating, funding, and managing the research project.

Report Number—assigned by originator.

Descriptive Note

Descriptors—subject terms found in the *Thesaurus of ERIC Descriptors* that characterize substantive content.

Identifiers—additional identifying terms not found in the *Thesaurus.*

Informative Abstract.

Abstractor's Initials.

Document Resumes

Elementary

Biology/Life Science

ED 042 634 SE 009 748
Plants in the Classroom. [Environmental Education Units.]
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—66p.
EDRS Price MF-$0.50 HC-$3.40
Descriptors—*Ecology, Elementary School Science, *Environmental Education, *Fine Arts, Instruction, *Instructional Materials, Kindergarten, *Outdoor Education, Teaching Guides
Identifiers—ESEA Title III

These four documents are concerned with methods of introducing ecology to elementary and kindergarten children. The first describes techniques for use in a classroom investigation of growing plants, emphasizing the interrelationships of plants and environment and is designed so that children learn variables must be controlled to arrive at valid conclusions. The second describes the organization of a "nature hunt" for kindergarten pupils. It is arranged so that the child experiences many areas of the primary school curriculum, including science, language arts, reading, numeral awareness, social studies, set theory, and music. The third outlines methods of using natural objects in art, including printing, casting, photography, soil and sand painting and weaving rush mats. An attempt is made to present art activities that will also be science experiences. The last is a classroom activity to emphasize the extent that non-returnable and non-decomposable containers are accumulating in the environment; each student records the number of containers used in a week and then an estimate is made of the amount the local community accumulates in a year. Suggestions for appropriate student actions are made. This work was prepared under an ESEA Title III contract. (AL)

ED 042 635 SE 009 749
Habitat Study. Transect Study [Environmental Education Units.]
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—94p.
EDRS Price MF-$0.50 HC-$4.80
Descriptors—*Biology, *Ecology, Elementary School Science, *Environmental Education, *Field Trips, Instructional Materials, *Outdoor Education, Teaching Guides, Teaching Techniques
Identifiers—ESEA Title III

These three documents outline teaching activities intended to involve children with their environment. Suggested preliminary studies to motivate and familiarize elementary school students with some characteristics of organisms and their physical environment are followed by descriptions of class activities that may be undertaken in the field. Suggestions for classroom analysis of the data at the conclusion of the study are included. Methods of sampling habitats are described; the transect technique is recommended. Simple techniques for measuring physical factors (such as precipitation, light intensity, humidity, wind velocity, and soil composition and characteristics) as well as collection and observation techniques for organisms (plants, soil microorganisms, invertebrates and vertebrates) are described. Details of construction of any apparatus required are included. This work was prepared under an ESEA Title III contract. (AL)

ED 042 636 SE 009 751
[Environmental Education Units.] Photography for Kids. Vacant Lot Studies. Contour Mapping.
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—86p.
EDRS Price MF-$0.50 HC-$4.40
Descriptors—*Biology, *Ecology, Elementary School Science, *Environmental Education, *Instruction, *Instructional Materials, Outdoor Education, Science Activities, Teaching Guides
Identifiers—Elementary and Secondary Education Act Title III

Techniques suitable for use with elementary school students when studying field environment are described in these four booklets. Techniques for photography (construction of simple cameras, printing on blueprint and photographic paper, use of simple commercial cameras, development of exposed film); for measuring microclimatic factors (temperature, wind speed and direction, humidity, light intensity, and soil moisture); and mapping (simple location of objects and contour mapping) are given. Instructions for making the apparatus required are provided and teaching strategies suggested. One of the booklets outlines a series of activities that can be conducted when studying a vacant city lot. This is felt to be an effective way of introducing biological principles to city children. The importance of man as part of the ecological system is emphasized by including a study of the biological effects of trash in the environment. All booklets contain background information for the teacher, and suggest ways the activities can be used to promote interdisciplinary activities. This work was prepared under an ESEA Title III contract. (AL)

ED 045 341 SE 008 967
Falana, Kenneth
Invertebrates [Student Guide with Pre-Test, Teacher's Guide, Quizzes 1-5 and Post-Test].
Broward County Schools, Fort Lauderdale, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Grant—OEG-3-7-703659-5091
Note—117p.
EDRS Price MF-$0.50 HC-$5.95
Descriptors—*Biology, *Elementary School Science, Instruction, *Instructional Materials, *Programed Texts, *Teaching Guides, Tests, Zoology
Identifiers—ESEA Title III

This programed text, designed for upper elementary and middle school students, is intended to give students a basic knowledge of invertebrates. Students are expected to be able to identify, name, describe, classify to phylum, and draw animals studied in the text when the unit is completed. A pretest, a series of quizzes and are provided. The teacher's guide lists the behavioral objectives of the unit, and suggests methods of supplementing the text with illustrations and specimens. This work was prepared under an ESEA Title III contract. (AL)

ED 068 310 SE 014 707
Jacobs, Joel Robert, Ed.
Sixth Grade: Fall and Winter Curriculum Guide.
Harrisburg City Schools, Pa. Outdoor and Environmental Education Center.
Pub Date 72
Note—86p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Curriculum Guides, Environmental Education, *Grade 6, Instructional Materials, *Learning Activities, Lesson Plans, Natural Resources, *Outdoor Education, Units of Study (Subject Fields)
Identifiers—ESEA Title I

Activity plans for sixth grade outdoor education experiences comprise the bulk of this curriculum guide. Many of the outlines have been developed through practical application and experimentation by staff members of the Outdoor and Environmental Education Center (OEEC) of the Harrisburg, Pennsylvania, City Schools. Activities and studies for the fall are related to amphibians, insects, poisonous plants, wilderness ecology, simple machinery energy and work, archery, gardening, and observation. Winter activities include the study of fish, invertebrate animals, animal signs, plant differences, human ecology and population, weather reporting and forecasting, compass skills, care and sharpening of tools, and communication. Each plan outlines: (1) steps for classroom introduction of the subject and preparation of the students for their outdoor laboratory exercises, (2) information as provided in the OEEC activity, and (3) topics/projects to consider for classroom follow-up and reinforcement. Vocabulary words, films, and books are listed where appropriate as supplemental aids. This work was prepared under an ESEA Title I contract. Related documents are SE 015 163 for grade four and SE 015 164 for grade five. (BL)

ED 068 366 24 SE 015 161
Heal, Fred A. And Others
Cattails or Concrete?
Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-0216
Pub Date 72
Contract—OEC-5-10-54
Note—294p.
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Elementary Grades, *Environmental Education, Instructional Materials, *Learning Activities, Natural Resources, Outdoor Education, Student Projects, *Study Guides

Developed for elementary science studies, this unit on man and environment requires student involvement in discovery, observation, gathering and recording data, and problem solving. A series of 19 booklets, each designed as an activity which can be completed out-of-doors, comprise this student packet of materials. Topics studied in the activities include: adaptation, communities, consumers, decomposers and decomposition, food chains, habitat, hearing, land use, marshes, nutrients, producers, profit (land values), and wetlands. Each booklet tells the student what he will study, what he should be able to do, what he needs to know, what materials he needs, and how to do the activity. Questions to answer and questions to think about as well as other ways to do the activity are listed. To summarize all the topics of study, a story is written about community concern and planning for an environmental issue. This set of materials was field tested in the spring of 1972 by the Wisconsin Research and Development Center for Cognitive Learning. (BL)

ED 068 367 SE 015 163

Jacobs, Joel Robert, Ed.

Fourth Grade: Late Fall and Early Spring Curriculum Guide.

Harrisburg City Schools, Pa. Outdoor and Environmental Education Center.

Pub Date 72

Note—83p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Curriculum Guides, Environmental Education, *Grade 4, Instructional Materials, *Learning Activities, Lesson Plans, *Natural Resources, *Outdoor Education, Units of Study (Subject Fields)

Identifiers—ESEA Title I

Activity plans for fourth grade outdoor education experiences comprise the bulk of this curriculum guide. Many of the outlines have been developed through practical application and experimentation by staff members of the Outdoor and Environmental Education Center (OEEC) of the Harrisburg, Pennsylvania, City Schools. Activities and studies for the late fall are related to vertebrate animals, fruits and seed dispersal, decay, forests, conservation of natural resources, the safe handling of tools, fire building, gardening, and plant reaction to seasonal change. Early spring activities include the study of mammals, arthropods, enemies of the forest, water pollution, land formation, shelters, bait casting, gardening, and animal reaction to seasonal change. Each plan outlines: (1) steps for classroom introduction of the subject and preparation of the students for their outdoor laboratory exercises, (2) information as provided in the OEEC activity, and (3) topics/projects to consider for classroom follow-up and reinforcement. Vocabulary words, films, and books are listed where appropriate as supplemental aids. This work was prepared under an ESEA Title I contract. Related documents are SE 015 164 for grade five and SE 014 707 for grade six. (BL)

ED 068 368 SE 015 164

Jacobs, Joel Robert, Ed.

Fifth Grade: Winter and Spring Curriculum Guide.

Harrisburg City Schools, Pa. Outdoor and Environmental Education Center.

Pub Date 72

Note—66p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Curriculum Guides, Environmental Education, *Grade 5, Instructional Materials, *Learning Activities, Lesson Plans, *Natural Resources, *Outdoor Education, Units of Study (Subject Fields)

Identifiers—EDEA Title I

Activity plans for fifth grade outdoor education experiences comprise the bulk of this curriculum guide. Many of the outlines have been developed through practical application and experimentation by staff members of the Outdoor and Environmental Education Center (OEEC) of the Harrisburg, Pennsylvania, City Schools. Activities and studies for the winter are related to reptiles, composition and germination of seeds, history of living things, rocks and minerals, erosion, ropes and knots, camping equipment and outdoor survival, wood cutting, and observation. Spring activities include the study of birds, flowers, simple plants, outdoor cooking, reforestation, and gardening. Each plan outlines: (1) steps for classroom introduction of the subject and preparation of the students for their outdoor laboratory exercises, (2) information as provided in the OEEC activity, and (3) topics/projects to consider for classroom follow-up and reinforcement. Vocabulary words, films, and books are listed where appropriate as supplemental aids. This work was prepared under an ESEA Title I contract. Related documents are SE 015 163 for grade four and SE 014 707 for grade six. (BL)

ED 073 929 SE 015 817

Environmental Curriculum Materials, Level II (2-3-4).

Delaware State Dept. of Public Instruction, Dover. Div. of Elementary Education.

Pub Date Jan 73

Note—183p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Discovery Learning, *Elementary Grades, Environmental Education, Field Trips, Grade 2, Grade 3, Grade 4, Instructional Materials, Instructional Program Divisions, *Learning Activities, Natural Resources, *Outdoor Education, *Teaching Guides

More than 60 outdoor activities and 50 follow-up activities for children in grades two, three, and four are collected in this teacher's guide. They focus on the interdependence of life; the relationship of man, animals, and plants to each other and to the environment. Most are designed as field trips, utilizing a discovery and questioning approach to learning. Based on pilot activities conducted at the Southeastern Pennsylvania Outdoor Education Center, they were subsequently revised and adapted by the New Castle-Gunning Bedford Environmental Laboratory, an ESEA Title III project. A master key divided the major activities into categories: (1) seasonal activities, (2) flora, (3) fauna, (4) habitat studies, (5) weather, geology, soils, hydrography, and (6) awareness, man and nature. For each activity also checked are appropriate grade level(s), season(s) in which to conduct it, and coordinated follow-up activity(ies). A similar key is provided for follow-up activities indicating the major activity which it is associated with in place of the coordinated follow-up activity. Each lesson outlines objectives, procedures and/or activities on the trip, and pertinent questions. Diagrams and charts supplement some of the information. (BL)

ED 073 930 SE 015 818

Environmental Curriculum Materials, Level III (5,6).

Delaware State Dept. of Public Instruction, Dover. Div. of Elementary Education.

Pub Date Jan 73

Note—203p.

EDRS Price MF-$0.65 HC-$9.87

Descriptors—*Discovery Learning, *Elementary Grades, Environmental Education, Field Trips, Grade 5, Grade 6, Instructional Materials, Instructional Program Divisions, *Learning Activities, Natural Resources, *Outdoor Education, *Teaching Guides

More than 50 outdoor activities and 60 follow-up activities for children in grades five and six are collected in this teacher's guide. They focus on the interdependence of life; the relationship of man, animals, and plants to each other and to the environment. Most are designed as field trips, utilizing a discovery and questioning approach to learning. Based on pilot activities conducted at the Southeastern Pennsylvania Outdoor Education Center, they were subsequently revised and adapted by the New Castle-Gunning Bedford Environmental Laboratory, an ESEA Title III project. A master key divides the major activities into categories: (1) seasonal activities, (2) flora, (3) fauna, (4) habitat studies, (5) weather, geology, soils, hydrography, and (6) awareness, man and nature. For each activity also checked are appropriate grade level(s), season(s) in which to conduct it, and coordinated follow-up activity(ies). A similar key is provided for follow-up activities indicating the major activity which it is associated with in place of the coordinated follow-up activity. Each lesson outlines objectives, procedures and/or activities on the trip, and pertinent questions. Diagrams and charts supplement some of the information. (BL)

ED 080 366 SE 016 620

[Field Learning Activities].

Nolde Forest Environmental Education Center, Reading, Pa.

Pub Date [73]

Note—281p.

EDRS Price MF-$0.65 HC-$9.87

Descriptors—*Curriculum Guides, Ecology, Elementary Grades, *Environmental Education, *Field Studies, Instructional Materials, Interdisciplinary Approach, *Learning Activities, *Natural Resources, Outdoor Education, Secondary Grades

Seventy field activities, pertinent to outdoor, environmental studies, are described in this compilation. Designed for elementary and junior high school students, the activities cover many discipline areas--science, social studies, language arts, health, history, mathematics, and art--and many are multidisciplinary in use. Topics range from soil study, animal traces, and watersheds to ecosystems, food chains, and succession; from mapping, stream surveys, and effects of air pollution to listening, expressing textures, and community profiles. An introductory page for each activity lists the learning experience (topic), curriculum area(s), grade level(s), and conceptual theme. Following this is a detailed account of objectives, unit concepts, background subject information or problem identification, materials needed, procedures for conducting the field activity, numerous questions, and follow-up activities. (BL)

ED 081 609 SE 016 625

Teacher's Guide, Ecology, Grade 4.

Yadkin Valley Economic Development District, Inc., Walnut Cove, N.C.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Pub Date [72]

Note—132p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Curriculum Development, *Ecology, *Elementary School Science, Environmental Education, Grade 4, Instructional Materials, *Investigations, Learning Activities, Natural Resources, *Student Projects, *Teaching Guides, Unit Plan

This teacher's guide has been constructed to assist in developing and implementing a life science course with an environment/ecological unit for Grade 4. Designed primarily for use with other science units, it offers numerous multidisciplinary activities which emphasize involvement in problem-solving through open-ended investigation rather than problem-doing only. Activity ideas range from a nature creep, plaster casting, animal tracks, and making an ecological diorama to the study of community/government/industry relations, natural selection, and awareness; from language arts, activities, ecology and natural resources projects, and pollution control to consideration of wildlife, population growth, and conservation. Resource material compiled in the final section gives an annotated film list, a bibliography of books, and sources for free and inexpensive materials oriented to the fourth grade level. Related documents are SE 016 627 and SE 016 628. (BL)

ED 081 610 SE 016 627

Teacher's Guide, Ecology, Grade 7.

Yadkin Valley Economic Development District, Inc., Walnut Cove, N.C.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Pub Date [72]

Note—149p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Curriculum Development, *Ecology, Environmental Education, Grade 7, Instructional Materials, *Investigations, Learning Activities, Natural Resources, *Secondary School Science, *Student Projects, *Teaching Guides, Unit Plan

This teacher's guide has been constructed to assist in developing and implementing a life science course with an environment/ecological unit for Grade 7. Designed primarily for use with other science units, it offers numerous multidisciplinary activities which emphasize involvement in problem-solving through open-ended investigation rather than problem-doing only. Activity ideas range from making a tin can barometer, conducting a plot study, and collecting insects and flowers from grassy fields to the study of food chains, natural areas, and golden rod galls; from tree measurement, soil study, and ecology and natural resources projects to an examination of eutrophication, community relationships, and pollution. Resource material compiled in the final section gives an annotated film list, a bibliography of books, and sources for free and inexpensive materials oriented to the seventh grade level. Related documents are SE 016 626 and SE 016 628. (BL)

ED 082 927 RC 007 401

Rillo, Thomas J.

Exploring the Insect World, An Outdoor Teaching Technique.

Pub Date 71

Note—21p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Elementary Grades, Enrichment Activities, *Entomology, Integrated Activities, *Interdisciplinary Approach, *Outdoor Education, *Science Activities, *Teaching Techniques

Information about the insect world and its advantages for the elementary classroom teacher is given in this paper, along with activities which can teach students about insects. The insect world tends to be noticed by the average person only when the small creatures become pests or inhabit man's abode. However, young students have a sharp sense of curiosity and are usually fascinated with insect activity. The teacher should use these characteristics to her advantage since the insect world is readily accessible through much of the school year. The teacher can combine this study with other regular subjects. Among the various activities recommended are: making an observation data chart; taking a field trip to study the noise made by various insects and recording them; mapping their activities; studying the relationship between 2 or 3 kinds of a certain insect; mapping travel at night; making a checklist of habitats or niches; collecting insects; making plaster of paris fossil imprints of insects or their homes; and identifying insects found on a single plant. The activities given include both outdoor and classroom activities. (NQ)

ED 086 490 SE 016 890

Evangelus, Nicholas J.

Enrichment Activities in Environmental Education.

Merrimack Education Center, Chelmsford, Mass.

Pub Date 27 Jul 73

Note—52p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Activity Learning, Annotated Bibliographies, Ecology, *Elementary Science, *Environmental Education, Field Studies, *Instructional Materials, Marine Biology, *Resource Materials

This series of activity units was written especially for elementary school teachers in Massachusetts. The material is divided into units--glaciation, topographic maps, parts of a flower, wildflowers, bog ecology, insects, freshwater flora, and marine ecology--many of which would be of interest to teachers in other locales. An annotated bibliography is divided into topic areas and an annotated listing of related ERIC documents is included. (LS)

ED 086 500 SE 016 949

Sterling, Vicki Hyland, Barb

Nature's Bulletin Board Ideas.

Chester Area Schools, S. Dak. Interlakes Environmental and Outdoor Education Program.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date [73]

Note—73p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Bulletin Boards, *Elementary School Science, Instructional Materials, Resource Guides, *Visual Aids

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This is a collection of over 50 bulletin board displays suggested for use in the elementary (K-8) science classroom. The recommended grade level for each is given, purpose stated, and relation to units in the curriculum given. Also included are general tips on making effective bulletin board displays. This work was prepared under an ESEA Title III contract. (LS)

ED 089 899 RC 007 801

Roller, Lib

Baggage Tags for Learning Out of Doors.

Nashville - Davidson County Metropolitan Public Schools, Tenn.

Pub Date 74

Note—33p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Audiovisual Aids, Classroom Games, *Curriculum Enrichment, Environmental Education, Individualized Instruction, Language Arts, Mathematics, *Merchandise Information, Natural Sciences, *Outdoor Education, Science Education, Signs, Social Studies, *Teacher Aides, Trails, *Visual Learning

The manual provides teachers with not only educational outdoor activities, but also with activities that can be provided on an individual level. The only equipment needed for most of these activities is a bought or homemade "baggage tag". These tags are used for a variety of purposes such as plant and animal identification, nature quiz games, and rockhunts. One of the best attributes of this method is that students can make up their own activities. In addition to general learning activities, the baggage tags can be used as a review or test. Suggested activities are grouped by subject area and level of difficulty. These are arbitrary, however, since any of them can be graded up or down to suit the students involved. There are 25 activities given for science; 15 for language arts; 10 for social studies; and 10 for math. (KM)

ED 092 389 SE 017 960

Environmental Learning Experiences for Kindergarten Through Second Grade.

Ohio State Dept. of Education, Columbus.; Willoughby-Eastlake School District, Willoughby, Ohio.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 73

Note—68p.; For related documents, see SE 017 961 and 962

EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE

Descriptors—*Elementary School Science, *Environmental Education, Grade 1, Grade 2, Instructional Materials, Interdisciplinary Approach, *Learning Activities, *Resource Materials, *Teaching Guides

Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

This collection of teaching units is one of three volumes designed to assist teachers in bringing relevant, interdisciplinary, environmental learning experiences to elementary students. This first volume is aimed at the K-2 level and deals with the immediate environment of the student. Titles of the nine units presented are: Preparing for Seasonal Change: Fall; The Terrarium; Food Chains; Food Web; Birds in Our Lives; Trees; Trash, Dirt and Stuff; and Kittens. For each unit, objectives are specified, a series of learning activities is described, and appendixes giving teacher background information and listing references (including books and periodicals, films, transparencies, duplicating masters, picture sets, pamphlets, and records) are provided. (DT)

ED 092 390 SE 017 961

Environmental Learning Experiences for Grades Three and Four.

Ohio State Dept. of Education, Columbus.; Willoughby-Eastlake School District, Willoughby, Ohio.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 73

Note—114p.; For related documents, see SE 017 960 and 962

EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE

Descriptors—*Elementary School Science, *Environmental Education, Grade 3, Grade 4, Instructional Materials, Interdisciplinary Approach, *Learning Activities, *Resource Materials, *Teaching Guides

Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

This second of three volumes designed to bring relevant, interdisciplinary, environmental learning experiences to elementary students is written for grades 3 and 4 and is concerned with the student's local environment. Titles of the 10 units included in this volume are: The School Lawn; The Vacant Lot; Giants on the Land: Trees in Our Environment; Wild Ideas with Wild Plants; The Endangered Predator; The Cemetery; An Environmental Quality Index for the School and Neighborhood; Poetry in the Environment; Water; and The Breath of Life--or Death: Air Pollution. For each unit, objectives are specified, a series of learning activities are described, and appendixes giving teacher background information and listing references for teaching resources are provided. (DT)

ED 092 391 SE 017 962

Environmental Learning Experiences for Grades Five and Six.

Ohio State Dept. of Education, Columbus.; Willoughby-Eastlake School District, Willoughby, Ohio.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 73

Note—84p.; For related documents, see SE 017 960 and 961

EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE

Descriptors—*Elementary School Science, *Environmental Education, Grade 5, Grade 6, Instructional Materials, Interdisciplinary Approach, *Learning Activities, *Resource Materials, *Teaching Guides

Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

The third of this series of three volumes on interdisciplinary environmental learning experiences for elementary students is aimed at grades 5 and 6 and deals with the comunity environment of the student. Titles of the eight units included in this volume are: Probleem Solving; How to Plan a Clean-up Campaign in the Local Community; Scars upon the Land; Water: Life Blood of the Earth; Noise Pollution; Succession and the Pond Community; Animals and Their Habitat; and Our Native Lands: Conserve and Preserve. Objectives are specified for each unit, a series of learning activities is described, and appendixes giving teacher background information and listing references and teaching resources are provided. (DT)

ED 094 912 RC 008 054

Environmental Education. Teacher's Handbook, Grade 5.

Nashville - Davidson County Metropolitan Public Schools, Tenn.

Note—153p.

EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE

Descriptors—American Indians, Conservation Education, Ecology, Enrichment Activities, *Environmental Education, *Grade 5, Natural Resources, *Outdoor Education, Pollution, Resource Materials, *Science Units, *Teaching Guides

Prepared for use in the 5th grade, this teacher's handbook consists of 19 science units dealing with environmental education. Topics are ecology, language arts, rocks and fossils, soil, noise pollution, Nashville pioneers and American Indians, conservation, waste and litter, water pollution, compass and mapping, plants and trees, use of the senses, animal homes, air pollution, arts and crafts, insects, mathematics outdoors, plot study, the total environment of an area, and energy. Unit objectives, time length, concepts, vocabulary, activities, and a list of resource materials are given for each. (NQ)

ED 097 209 SE 018 215

Animals. Environmental Education Curriculum.

Topeka Public Schools, Kans.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Nov 73

Note—224p.; Best copy available; Occasional

marginal legibility
EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE
Descriptors—Animal Behavior, Animal Facilities, *Biology, *Curriculum Guides, Ecology, *Elementary School Science, *Environmental Education, Instruction, Instructional Materials, Learning Activities, Zoology
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

The material in this unit is designed to provide upper elementary students with information and experiences to develop a better understanding and appreciation of the variety of animals living today. Unit goals include fostering a better understanding of animals' roles in nature, developing observational skills, facilitating understanding of man's influence on animals, and helping students develop positive attitudes toward animals. Topics include animal biology, effect of climate on animals, zoo animals and endangered species. Evaluation instruments are provided for both cognitive and affective objectives through the use of written pretests and posttests developed for this unit. Appendices provide various teaching aids such as animal diagrams and descriptions, stories and poetry about various animal characteristics, available appropriate slide-tape narrations and films, climate maps and field trip related information. (MLB)

ED 097 213 SE 018 220
Plants. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date May 74
Note—183p.; Best copy available; Occasional marginal legibility
EDRS Price MF-$0.75 HC-$9.00 PLUS POSTAGE
Descriptors—Biological Sciences, *Botany, *Curriculum Guides, *Elementary School Science, *Environmental Education, Instruction, Instructional Materials, *Intermediate Grades, Natural Resources, Plant Growth, Plant Identification, Plant Science
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

The study of plants is often limited to studying plant structure with little emphasis on the vital role plants play in our natural system and the variety of ways man uses plants. This unit, designod for intermediate level elementary students, reviews basic plant structure, discusses roles of plants in nature's system, illustrates plant adaptations, discusses major plant biomes and examines ways man has utilized plants. Also presented are a variety of activities centered around myths and folklore about plants, poetry about plants and information on state flowers and trees. The unit culminates with a visit to a local conservatory. Suggested time lines, methodologies and evaluative instruments are included. (MLB)

ED 097 215 SE 018 222
Life - Past, Present and Future. Environmental Education Curriculum. Revised.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jan 74
Note—137p.; Teacher Paper L, Page 5 omitted; Best copy available; Occasional marginal legibility
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—*Biological Sciences, *Curriculum Guides, Demography, Ecology, *Environmental Education, Instruction, Instructional Materials, Life Style, *Population Education, Science Education, *Secondary School Science
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This unit attempts to interrelate the traditional biological science studies such as food webs, population changes and ecological succession to form a coherent picture of our world today, the factors that created it and the forces that continue to change it. Designed for use in the secondary schools, it is built around nine films and has seven basic topics: (1) Prehistoric life, the sequence and causes of the changing plant and animal communities; (2) Causes of climatic patterns; (3) Roles of participants in natural communities; (4) Biomes throughout North America; (5) Population; (6) Adaptations; and (7) Man's role in the natural environment. Teaching aid materials include behavioral objectives of the unit, a suggested time line, suggested methodologies, an annotated list of the nine films and suggested evaluative instruments. (MLB)

ED 097 221 SE 018 229
The Living Forest. Environmental Ecological Education Project. Revised.
Parkway School District, Chesterfield, Mo.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jun 72
Note—68p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Biology, *Conservation Education, *Curriculum Guides, *Ecology, Elementary School Science, *Environmental Education, *Forestry, Instructional Materials, Intermediate Grades, Learning Activities, Natural Resources, Units of Study (Subject Fields)
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This unit, designed for intermediate grades of elementary schools, focuses on the living forest by presenting such concepts as succession, forest communities, adaptation, ecological interrelationships, animal populations, the impact of man on forests, and job opportunities in the forest industry. The unit includes the behavioral objectives and the expected student criteria for evaluation, pretests and posttests, suggested methodologies for teaching each concept, relevant background information, suggested student data sheets, and a bibliography of both student and teacher resources. (MLB)

ED 098 073 SE 018 239
Abbott, Verlin M.
Communities in Nature. Environmental Ecological Education Project. Revised June, 1972.
Parkway School District, Chesterfield, Mo.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jun 72
Note—47p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Biology, Conservation Education, *Curriculum Guides, *Ecology, *Elementary School Science, *Environmental Education, *Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Primary Grades, Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This unit, an interdisciplinary ecological approach to study communities in nature, considers various types of relationships such as mutualism, commensalism and succession to determine general characteristics of a community and interrelationships between communities. Designed for primary school children, food chains, food webs, reproduction, competition and job opportunities related to communities in nature are presented. The unit includes cognitive, psycho-motor and affective behavioral objectives, expected student criteria for evaluation, pretests and posttests, suggested methodologies for teaching each concept, relevant background information, a vocabulary list, student data sheets and a bibliography of both student and teacher resources. (MLB)

ED 099 149 RC 008 213
Schumacher, C. M.
A Teacher's Guide To: Indians and the Outdoor Classroom.
Soil Conservation Service (DOA), Huron, S. Dak.
Pub Date Apr 74
Note—35p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—*American Indians, Botany, Definitions, Ecology, *Environmental Education, *Outdoor Education, *Plant Identification, *Teaching Guides
Identifiers—*South Dakota

As a basic teacher's guide to the study of plants in their environment, this document serves primarily as a starting point for outdoor education with an American Indian emphasis in the State of South Dakota. The State is divided into three broad environmental categories or "biotic communities" (Prairie and Plains, Woodlands, and Wet Places); lists of plants found in each of these biotic communities are grouped under the further classifications of Trees, Shrubs and Woody Vines, Forbs, and Grasses. Each plant listed is identified by both common and scientific names. Detailed annotations following each definition emphasize the American Indian usage and/or knowledge of the plant described. An index is provided. (JC)

ED 100 637 SE 016 934
Walnut Springs Interest Unit, Fairmount Avenue School. Primary Unit--Team I.
State College Area School District, Pa.
Pub Date Oct 71
Note—50p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Biological Sciences, Botany, *Conservation Education, *Elementary Education, *Environmental Education, Instructional Materials, Learning Activities, Natural Resources, Outdoor Education, Primary Grades, *Science Education, *Teaching Guides, Zoology

This environmental education teaching guide was designed for primary teachers who may want to develop their own environmental education units or who may wish to integrate the units contained in the guide into their own curriculum. The units in the guide were developed by primary teachers and reflect the experiences of the Fairmont Avenue School students and teachers at a nearby park. The guide is divided into five small interest units which provide primary children an opportunity to choose an area of learning and study this area in a group situation. The interest groups within the guide include the aquarium interest group, insect interest group, dried flowers interest group, leaves and trees interest group and the terrarium interest group. Each interest unit contains objectives, procedures, field trip, follow up, evaluation, and reference materials. Further information including wildflower illustrations; insect facts; instructions for making an insect cage, illustration of insects, animals, and plants; safety rules; and a sample permission letter are included. (TK)

ED 103 233 SE 018 514
Brine Shrimp and Their Habitat, An Environmental Investigation.
Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.
Pub Date 72
Note—21p.; Related documents are SE 018 515-534
Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79169, $1.50)
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—Elementary Education, *Elementary School Science, Environmental Education, *Instructional Materials, Investigations, Learning Activities, Natural Resources, *Science Activities, *Science Education
Identifiers—*Brine Shrimp

This environmental unit is one of a series designed for integration within the existing curriculum. The unit is self-contained and students are encouraged to work at their own speed. The philosophy of the unit is based on an experience-oriented process that encourages independent student work. This unit explores the life cycle of brine shrimp and the effects of the environment on that cycle. The unit contains a series of related activities that illustrate basic ecological principles of interrelationships. Teacher information such as materials needed, background information, and additional topics is given. The unit is designed for students, grades 1-5. More sophisticated investigations are given at the end of the unit. A bibliography is included. (MA)

ED 103 234 SE 018 515

Change in a Small Ecosystem, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—25p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79187, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Grades, *Environmental Education, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, *Science Education, Secondary Grades, Teaching Guides

Identifiers—*Ecosystems

This environmental unit is one of a series designed for integration within an existing curriculum. It is self-contained and students are encouraged to work at their own speed. The philosophy behind the series is based on an experience-oriented process that promotes independent student work. This particular unit explores the concept of succession in communities. The activities included develop the major concept by requiring students to set up small aquaria and to observe the changes that take place in these small communities. Sampling and population prediction techniques are included in the activities. Teacher information concerning background information, materials, and additional topics is given. This unit is designed for students, grades 5-9. A short bibliography is included. (MA)

ED 103 237 SE 018 518

Differences in Living Things, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 71

Note—16p.; Related documents are SE 018-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79025, $1.00)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Elementary Grades, *Environmental Education, *Genetics, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, *Science Education, *Teaching Guides

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of this series is based on an experience-oriented process that encourages self-paced independent student work. The purpose of this particular unit is to prove that variation does exist within populations. Skills employed in the unit's activities include collection techniques, quantitative measurement methods, record-keeping, and the use of graphs. Materials for study can be collected at a preliminary field trip or from classroom potted plants. Activities are geared for students in grades 4-8. Teacher information such as materials, background information, and additional, more sophisticated topics is given. (MA)

ED 103 238 SE 018 519

Fish and Water Temperature, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 71

Note—24p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79070, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Elementary Grades, *Environmental Education, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, Natural Resources, *Physiology, *Science Education, Secondary Grades, *Teaching Guides, Temperature

Identifiers—Fish

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of this series is based on an experience-oriented process that encourages self-paced independent student work. This particular unit illustrates the interrelationship between living things and their environment. The activities are concerned with the effects of water temperature on fish. Students learn to make observations, collect data, and use graphs to interpret information. The unit is designed for students in grades 4-9. Additional, more sophisticated investigations are included at the end of the materials. Materials, directions, and background information are included for the teacher's convenience. A short bibliography for students and teachers is provided. (MA)

ED 103 239 SE 018 520

Genetic Variation, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—25p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79123, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Elementary Grades, *Environmental Education, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, Natural Resources, Population Education, *Science Education, Secondary Grades, *Teaching Guides

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires very little teacher preparation. The philosophy of this series is based on an experience-oriented process that encourages self-paced independent student work. In this unit, students explore possible explanations for diversity within populations. The activities are divided into two sections, the first being concerned with the human populations, and the second with seed populations. Students are asked to make observations of variability in physical characteristics of classmates and to develop hereditary patterns by constructing a family tree. Observations of physical characteristics of seeds and their distribution are also included. This unit is designed for students in grades 4-9. It includes a list of materials needed, background teacher information, directions, additional topics, and short teacher and student bibliographies. (MA)

ED 103 241 SE 018 522

Nature Hunt, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—17p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79105, $1.00)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Ecology, Elementary Grades, *Environment, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, *Natural Resources, Outdoor Education, Primary Education, *Science Education, Teaching Guides

This environmental unit is one of a series designed for integration within the existing curriculum. The unit is self-contained and requires little teacher preparation. The philosophy of the unit is based on an experience-oriented process that encourages self-paced independent student work. In this unit, young primary school children are encouraged to explore a natural area through outdoor activities. They work in small groups to observe, compare, arrange, and communicate their discoveries. This investigation is set up as a game. Students are given containers with natural items collected from the area and with photographs of representative sites in the area. Their goal is to identify and collect items similar to those in the containers and to identify the areas in the photographs. All items are to be brought back to the classroom for study and exchange. Information for teachers includes a list of materials needed, directions for the activities, and field trip preparations. (MA)

ED 103 243 SE 018 524

Oaks, Acorns, Climate and Squirrels, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 71

Note—25p.; Related documents are SE 018 514-554

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79089, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Elementary Grades, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, Outdoor Education, *Plant Growth, Primary Education, *Science Education, Teaching Guides

Identifiers—Oak Trees, *Plants

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the units is based on an experience-oriented process that encourages self-paced independent student work. In this particular unit, oaks and acorns are the vehicle by which primary school children discover the interrelationships of organisms in their environment. The unit is divided into four parts. In the first part, students work outside to collect and plant acorns and to observe their development into seedlings. Next, the students determine when acorns fall from the trees and discover the larvae living inside them. In the third part, the role of squirrels is studied in relation to the acorns. Lastly, the effect of climate on acorn germination is determined. These activities provide background information, materials needed, directions, and additional topics for teachers. (MA)

ED 103 244 SE 018 525

Outdoor Fun for Students, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—25p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79230, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Grades, Elementary Secondary Education, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, Outdoor Education, *Science Education, Secondary Grades, Teaching Guides

Identifiers—Plants, Soil

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires little teacher preparation. The philosophy of the units is based on an experience-oriented process that encourages self-paced independent student work. The purpose of this unit is to provide educational and enjoyable outdoor activities for students of all ages. The unit is divided into four sections, the first of which being concerned with seed dispersal. In the second section, students investigate goldenrod galls and the environmental influences on the wasps that hatch from them. In the next section, students study the succession of plant decomposition, and finally, they observe soil organisms and study the environmental factors that affect those organisms. The activities can be modified for use with students in all grades. Information provided includes a list of materials needed, directions, and student worksheets. (MA)

ED 103 245 SE 018 526

Plant Puzzles, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—21p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79130, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Botany, Elementary Education, Elementary Grades, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, Outdoor Education, *Plant Identification, *Science Education, Teaching Guides

Identifiers—*Plants

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the units is based on an experience-oriented process that encourages self-paced independent student work. The purpose of this unit is to familiarize students with the structural organization, or pattern, of natural objects. Specifically the students study the structure of tree or shrub branches that they have collected. Students exchange branches and keep their data recorded in a branch booklet. The duplicating masters for the booklet are included in the materials. After the students have studied a variety of branches, they try to reconstruct a branch that has been divided into the parts of a plant puzzle. Additional activities include counting annual rings of trees, observing buds, and rooting branches. The activities are geared for students in grades 1-6. A list of materials needed, directions, and background information are included for the teacher. (MA)

ED 103 246 SE 018 527

Plants in the Classroom, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 71

Note—25p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79007, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Botany, Elementary Grades, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, *Plant Science, Primary Education, *Science Education, Teaching Guides

Identifiers—*Plants

This environmental unit is one of a series designed for integration within the existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of this series is based on an experience-oriented process that encourages self-paced independent student work. This particular unit, designed for the primary grades, is an introduction to ecology. Using plants that are easily grown in the classroom, students learn about the environmental factors, such as light, water, and soil, that affect plant growth. Through the activities included in this unit, students experiment with controlling these variables, while making observations and keeping accurate data. The plants needed for the investigation include cuttings from house plants, potatoes, bulbs, and seeds. A list of materials, directions, backgroun information, and student worksheets that can be duplicated are included for the teacher. (MA)

ED 103 247 SE 018 528

Sampling Button Populations, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—21p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79098, $1.00)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Education, Elementary Grades, *Environmental Education, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, Natural Resources, *Sampling, *Science Education, Secondary Grades, Teaching Guides

This environmental unit is one of a series designed for integration within an existing curriculum. The units are self-contained and require minimal teacher preparation. The philosophy behind the units is based on an experience-oriented process that encourages self-paced independent student work. This particular unit is an introduction to the techniques of sampling. Using button and bean populations, students learn various ways of sampling. Next, they learn to use this data by constructing simple graphs based on their statistical analysis of the samples. At the end of the unit are eight additional activities designed for independent study. Students can investigate variations within human and plant populations and statistically study their frequency through random sampling techniques. This unit is designed for students in grades 3-9. Each activity contains a list of materials, directions, and discussion questions to aid the teacher. (MA)

ED 103 253 SE 018 534

Transect Studies, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—33p.; Related documents are SE 018 514-533

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79196, $1.50)

EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE

Descriptors—*Ecology, Elementary Grades, *Environmental Education, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, Natural Resources, Outdoor Education, *Science Education, Secondary Grades, *Teaching Guides

Identifiers—*Transect Studies

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the units is based on an experience-oriented process that encourages self-paced independent student work. In this unit, students make a line transect and then study the different organisms found along it. Preliminary activities are cncerned with familiarizing students with techniques of measuring temperature, light intensity, wind direction, and kinds of organisms. Next, students prepare the materials to be used at the field site. On the field trip, students collect as much data as possible along their transect. At a classroom debriefing session, students discuss their findings and attempt to identify interrelationships. The activities include a list of materials needed, directions for building the equipment, data collection techniques, and questions for discussion. The latter half of the unit is devoted to sample graphs and data sheets that can be duplicated for the students. Suggested grade levels for this unit are 3-9. (MA)

ED 164 347 SE 026 336

The Aquarium: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—27p.; For related documents, see SE 026 337-343; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Biology, *Ecological Factors, *Elementary Education, Environment, Environmental Education, Language Arts, Marine Biology, Mathematics Education, Natural Resources, *Oceanology, Science Education, *Water Resources

This interdisciplinary unit is intended for use in second grade classes; however, it can be used K-8 with modifications. The unit seeks to demonstrate that aquatic organisms interact in complex ecosystems and that these organisms react to their environment in different ways. Specific directions are given for setting up an aquarium and populating it with fish and plants. Specific activities are then presented using the aquarium or the aquarium theme to teach concepts in various subject areas. A bibliography of reference materials for further reading is provided. (RE)

ED 164 348 SE 026 337

The Beaver: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—38p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Biology, Conservation Education, *Ecology, *Elementary Education, Environmental Education, Grade 3, *Instructional Materials, Language Arts, Music, Science Education, Social Studies, *Wildlife Management

Identifiers—*Beaver

This interdisciplinary unit is intended for use with third grade classes. It examines the history and economics of man's relationships to the beaver. It investigates the natural history of the beaver, its anatomy, range, food sources, and the skills it employs to modify its environment by building dams. The structure of beaver dams is examined. Lessons are provided to incorporate concepts of various disciplines of study and can be used in various subject curricula. (RE)

ED 164 349 SE 026 338

Clams and Other Critters: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—32p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Biology, *Ecological Factors, Ecology, *Elementary Education, Environmental Education, *Instructional Materials, Kindergarten, Language Arts, Marine Biology, *Oceanology, Science Education, *Water Resources

This interdisciplinary unit is intended for use in kindergarten classes. The unit follows the story line of the book, "Grandma's Beach Surprise," or any suitable children's story about the seashore environment. The unit deals with shelled animals found along the ocean shore. It includes the anatomy of various mollusks, their interaction with the marine and estuarine environment, and their value as a food source to man. Poems, art projects, class discussions, sorting shells, preparation of edible shellfish, and singing are among the activities included with this unit. (RE)

ED 164 350 SE 026 339

Finestkind: The American Lobster. A Learning Experience for Marine Education. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—63p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions

EDRS Price MF-$0.83 Plus Postage. HC Not

Available from EDRS.

Descriptors—*Biology, *Ecological Factors, *Elementary Education, Environment, Environmental Education, *Instructional Materials, *Marine Biology, Natural Resources, *Oceanology, Science Education, Water Resources

Identifiers—*Lobster

This interdisciplinary unit is intended for use in the fourth grade. Through discussion of the American Lobster, its economics, history, literature, and biology, the unit describes the effects of the marine environment on human history and culture. Sections deal with how marine organisms have evolved. Detailed descriptions are provided of lobster fishing procedures and equipment and discussion covers the development of cultures that depend on the resources of the see for income or food. (RE)

ED 164 351 **SE 026 340**

Marine Art: A Resource Unit. A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—29p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Art, *Art Activities, Art Education, Art Expression, *Art Materials, *Elementary Education, Environment, *Instructional Materials, Natural Resources, *Oceanology

This interdisciplinary unit is intended for use in grades K-1 and can be modified for use through grade 3. The unit encourages students to express themselves through art, using materials found at the beach and brought into the classroom. The activities can be used separately whenever art is called for in the curriculum or can be integrated into other classroom topics. Suggested tie-ins are given with each activity. (RE)

ED 164 352 **SE 026 341**

Our Heritage of Ships: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—64p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—Economics, *Elementary Secondary Education, Environmental Education, History, *Instructional Materials, *Ocean Engineering, *Oceanology, Science Education, Seamen, Social Sciences, *Transportation

Identifiers—*Ships

This interdisciplinary unit is designed to familiarize students with their heritage of ships and their importance today. Each lesson deals with a different ship type. Following each lecture or reading, a series of suggested multidisciplinary activities are suggested. These are intended as a basis for teacher or student modification or addition. The unit provides a brief history of shipping as it affected New England, relates folklore and traditions stemming from shipping history, discusses power sources for each vessel, and relates nautical poetry and literature to specific events in shipping history. The unit deals with modern concepts and considerations of shipping. (Author/RE)

ED 164 353 **SE 026 342**

Shipping, Ships and Waterways: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—92p.; For related documents, see SE 026 336-343; Not available in hard copy due to copyright restrictions; Contains occasional marginal legibility in drawings

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Elementary Secondary Education, *Instructional Materials, Language Arts, Marine Technicians, Mathematics Education, Ocean Engineering, *Oceanology, *Science Education, Social Studies, *Transportation

Identifiers—*Ships

This multidisciplinary unit is designed to increase familiarity with various types of ships and purposes for different varieties of marine vessels. It seeks to increase familiarity with routes of ocean shipping and the effect of ocean conditions such as currents upon shipping route patterns. A discussion treats the uses of various navigation guides such as channel markers and buoys. The unit uses whole class instruction as well as individual projects. Field trip ideas are included. (RE)

ED 164 354 **SE 026 343**

Whale Multi-Disciplinary Studies: A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—Jan 79

Note—63p.; For related documents, see SE 026 336-342; Not available in hard copy due to copyright restrictions; Contains occasional marginal legibility

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—Biological Sciences, Elementary Education, *Elementary School Science, Environmental Education, History, *Instructional Materials, *Marine Biology, Natural Resources, *Oceanology, Science Education, *Water Resources

Identifiers—*Whales

This multidisciplinary unit deals with whales, whaling lore and history, and the interaction of the whale with the complex marine ecosystem. It seeks to teach adaptation of marine organisms. It portrays the concept that man is part of the marine ecosystem and man's activities can deplete and degrade marine ecosystems, endangering the survival of species and affecting marine habitats. The unit is targeted at grade level 4, 5, or 6, but may be adapted for K-12. It requires a minimum of 15 classroom hours or may be expanded to a full year's program. (RE)

ED 167 421 **SE 026 844**

Odell-Fisher, Ellen Giese, Ronald N.

Sensing the Sea: A Curriculum Guide in Marine Education for Grades Two and Three.

Virginia Inst. of Marine Science, Gloucester Point, Va.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—78

Note—57p.

Available from—Marine Education Center, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062 ($2.00)

Pub Type—Guides - Classroom - Teacher (052) — Guides - Classroom - Learner (051)

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—*Biology, Elementary Education, *Elementary School Science, *Environmental Education, *Marine Biology, *Oceanology, Primary Education, *Science Activities, Science Education, Zoology

This is a curriculum guide in marine education for grades two and three. It gives information for the setup and maintenance of marine aquariums, as well as information on the care and feeding of marine animals. The unit should take about three or four weeks. A calendar is given showing the amount of time needed for each part. The guide is divided into seven parts entitled: (1) Setting Up; (2) Observing Marine Animals; (3) Inferring About Marine Animals; (4) Classifying Beings 'n Things; (5) Inferring About Parts of Living Things; (6) Problem Solving; and (7) Evaluation. Each section contains two to four student activities. A list of related books and films are also given for each section. (BB)

ED 174 442 **SE 028 431**

Odell-Fisher, Ellen Giese, Ronald N.

Sensing the Sea: A Curriculum Guide in Marine Education for Grades Kindergarten and First. Educational Series Number 23.

Virginia Inst. of Marine Science, Gloucester Point, Va.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—79

Note—48p.; For related document, see ED 167 421

Available from—Marine Education Center, Virginia Institute of Marine Science, Gloucester Point, Virginia 23062 ($2.00)

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC02 Plus Postage.

Descriptors—Biology, *Elementary Education, Elementary School Science, Environment, Environmental Education, Grade 1, *Marine Biology, *Natural Resources, *Oceanology, *Science Curriculum, Science Education, Water Resources, Zoology

This curriculum unit deals with the establishment and maintenance of a saltwater aquarium in the classroom. The unit seeks to arouse the student's curiosity and interest in the aquatic environment by involvement in the sequence of activities relating to the marine aquarium. Detailed instructions are provided in preparing and stocking the aquarium. Teaching suggestions are included along with technical instructions. Appendices include: (1) a list of aquarium supplies; (2) marine life suppliers; (3) book publishers; and (4) a story relating concepts of the marine environment. (RE)

ED 180 808 **SE 029 537**

Conner, Shirley

The Pond Community. Primary Level. Teacher's Manual.

Rocky River Public Schools, Ohio.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.

Pub Date—Mar 77

Note—25p.; For related document, see SE 029 538

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC01 Plus Postage.

Descriptors—Biology, *Conservation Education, *Ecology, Elementary Education, Elementary School Science, *Environment, *Environmental Education, Natural Resources, Science Education, Teaching Guides, *Water Resources

This teacher's guide includes four lessons dealing with animals and plants associated with ponds. Species discussed are selected because of their unusual means of adaptation to the pond environment. Each lesson includes suggestions on introducing the unit, discussion suggestions, blackboard activities, and activities with pictures and a magnetic board. Master activity sheets are provided. (RE)

ED 180 809 **SE 029 538**

Metro, Peter M. Green, Rachel E.

The Pond Community. Teacher's Manual.

Rocky River Public Schools, Ohio.

Spons Agency—Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.

Pub Date—Mar 77

Note—71p.; For related document, see SE 029 537; Contains occasional light and broken type

Pub Type—Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Biology, Conservation Education, *Ecology, *Environment, *Environmental Education, Natural Resources, Science Activities, Science Education, Secondary Education, Teaching Guides, *Water Resources

This study guide is intended as preparation for a visit to a pond. Each lesson includes pre-study questions and post-study questions involving the content of the lesson. Numerous drawings and diagrams are included in each lesson. Also included in the guide are a glossary, bibliography, and a detailed teacher's guide. (RE)

ED 180 811 **SE 029 540**

Ecology Enrichment, Grades 1-6.

Rocky River Public Schools, Ohio.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.
Pub Date—[77]
Note—170p.; For related document, see SE 029 541
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—Conservation Education, Ecology, *Elementary Education, Environment, *Environmental Education, Field Trips, Natural Resources, *Outdoor Education, Process Education, *Science Activities, *Science Education

This collection of curriculum materials is arranged by grade level for each elementary grade. Materials are recommended for use in conjunction with trained volunteer instructors and with access to an outdoor education center, a park, or a wooded area near the school. Level K-3 emphasizes basic observational and process skills, while levels 4-6 emphasize process also, but are not as directive as for grade levels K-3. Activities at all levels include a rationale statement, an instructional objective, a pretest, a list of vocabulary words (when appropriate), background information, instructional procedure, and specific activities. (RE)

ED 195 389 **SE 031 474**
Warren, Mark
Magic From the Woods. A Teacher's Handbook for Environmental Education.
Georgia Conservancy, Atlanta.
Pub Date—79
Note—60p.
Available from—Barbara Smith, Program Director, Georgia Conservancy, 3110 Maple Drive, N.E., Atlanta, GA 30305 ($2.95).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Biological Sciences, *Conservation Education, *Ecology, Elementary Education, *Environmental Education, *Learning Activities, *Outdoor Education, Sciences, Sensory Training
Identifiers—*Forests

This workbook contains suggestions for environmental learning adventures for elementary school children in a forest. The activities are classified under various concepts such as sound, growth, adaptation, force, variety, water, habitat, design time, and conservation. The concept is first defined. Then a preparation exercise to get the students actively involved in the subject is presented. This may be a conversation about familiar things or an inside preparation game. Under the concept heading, the handbook provides a series of games, exercises, and explorations designed to let the child experience that concept. (SB)

ED 195 391 **SE 033 092**
Crowley, Rose Lea And Others
Teacher's Guide for Budding Twigs. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—70
Note—50p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Biology, *Botany, Elementary Education, *Elementary School Science, Grade 4, Grade 5, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, *Teaching Guides, *Trees, *Units of Study
Identifiers—Shrubs

This teaching guide supplements a science unit concerned with bud maturation recommended for use in fourth- and fifth-grade classrooms. The first section describes possible activities for children to explore, such as field study, collections, dissecting, and experiments. The second section offers a few brief suggestions for teaching the unit. The third section outlines methods for obtaining and preserving twigs. (CS)

ED 196 659 **SE 033 096**
Gillmor, Mary S. And Others
Teacher's Guide for Starting From Seeds. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017726-0
Pub Date—71
Note—32p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Botany, Elementary Education, *Elementary School Science, *Plant Growth, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, Science Instruction

This teacher's guide suggests activities that provide a wide range of opportunities for children in grades 1-7 to plan, direct, and carry out experiments with seeds and the growth of plants. Photographs are provided and methods discussed for guiding students in exploring the growth of seeds, the effect of dark on growth, factors causing plants to bend as they grow, cutting plants during growth, and effects of salt, temperature, and insects on growth. (CS)

ED 196 661 **SE 033 098**
Webster, David And Others
Track Picture Book. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07 017702-3
Pub Date—71
Note—82p.; For related document, see SE 033 099. Photographs may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Animals, Elementary Education, *Elementary School Science, Instructional Materials, *Outdoor Activities, Science Activities, Science Course Improvement Projects, *Science Curriculum
Identifiers—*Animal Tracks

This picture book was designed to be used with an Elementary Science Study unit that provides opportunities for students in grades 4-6 to study animal tracks. Shown within this book are numerous examples of tracks, including those of tires, human beings, animal tracks, and others in various media, such as snow, sand, mud, dust, and cement. (CS)

ED 196 662 **SE 033 099**
Alexander, David And Others
Teacher's Guide for Tracks. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017701-5
Pub Date—71
Note—96p.; For related document, see SE 033 098. Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Animals, Elementary Education, *Elementary School Science, *Outdoor Activities, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, Science Instruction
Identifiers—*Animal Tracks

This teacher's guide suggests activities that provide opportunities for students in grades 4-6 to study animal tracks. Methods are explained for using sets of 32 Track Cards which show life-size drawings of tracks made by 14 animals; sets of 10 large Mystery Track Cards with life-size drawings of the prints of large mammals; and a Track Picture Book which shows many kinds of tracks, including tracks made by wind, waves, wheels, and tires. Activities are explained for exploring animal tracks out-of-doors, making casts of animal tracks, and interpreting track pictures. (CS)

ED 196 673 **SE 033 229**
Gillmor, Mary S. And Others
Animals in the Classroom: A Guide for Teachers. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017706-6
Pub Date—70
Note—64p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Animal Facilities, *Animals, Elementary Education, *Elementary School Science, *Interdisciplinary Approach, *Science Activities, Science Course Improvement Projects, Science Education, Science Programs

This guide is designed to encourage people to keep animals of all kinds in the classroom and to use them in teaching language arts, mathematics, and social studies, as well as science and nature study. The booklet is divided into four sections. The first section contains an account of a year with desert animals in an ungraded classroom of six- to eight-year-olds. The second section contains a checklist of things you need to consider for animal care. The third and fourth sections describe methods that have been used successfully in caring for gerbils and two kinds of desert lizards. Some simple, inexpensive cages are described which can be used for lizards and gerbils as well as for other animals. A brief list of books about animals concludes this book. (Author/DS)

ED 196 735 **SE 034 055**
If Animals Could Talk: Bald Eagle, Bear, Florida Panther, Gopher Tortoise, Indigo Snake, Manatee, Otter, Raccoon.
Pinellas County District School Board, Clearwater, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—79
Note—94p.; Contains occasional light and broken type.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Animals, Biology, *Ecology, *Elementary School Science, *Environmental Education, Reading Materials, Science Education, Science Instruction, *Wildlife
Identifiers—Endangered Species

In this series of booklets, eight Florida animals describe their appearance, habitats, food, behavior, and relationships with humans. Each entry is written for elementary students from the animal's point of view and includes a bibliography. Contained are the life stories of the bald eagle, black bear, Florida panther, gopher tortoise, Eastern indigo snake, manatee, otter, and raccoon. (WB)

Elementary

Careers

ED 095 294 CE 001 844
Haberman, Don, Ed. Crabtree, Jacquelyn, Ed.
Samples of Career Education K-6. Units in Health, Science, Mathematics, Language Arts, Social Studies.
Pottawattamie County School System, Council Bluffs, Iowa.
Pub Date 17 Mar 72
Note—112p.; Forty-six pages of pictures removed as they will not reproduce
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Career Education, Elementary Grades, Instructional Materials, *Integrated Activities, Interdisciplinary Approach, *Resource Materials, Teacher Developed Materials
Identifiers—Iowa

In this document, developed by teachers during two career education workshops, are varied ideas on ways that career education can be integrated into subject matter areas in the elementary grades. Emphasis is placed on the use of local business as resources both for learning experiences in subject areas and for career awareness experiences. Classroom, field experiences, and sources of material for further study are all included. Mathematics experiences are illustrated with reference to work in a service station, a nursery, a bakery, and a department store. Jobs requiring skill in the mathematics, language arts, and health and science areas are listed. A short section discusses ideas for implementing career education in the elementary school. (SA)

ED 106 606 CE 003 778
Forest Services: World of Work Project: Fifth Grade: Science.
Utah State Board for Vocational Education, Salt Lake City.
Note—65p.; For related documents, see CE 003 775-77
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—*Career Awareness, Career Education, Conservation Education, *Curriculum Guides, Elementary Education, *Forestry, *Forestry Occupations, Grade 5, Integrated Curriculum, Learning Activities, Occupational Information, Resource Materials, *Resource Units, Science Curriculum
Identifiers—*World of Work

The document is one of the teaching units developed by the Utah World of Work Project, designed to integrate career awareness into the regular curriculum at the elementary level. The fifth grade guide is tied to the science area and focuses on conservation as practiced by Forest Service workers; the growth cycle of forests and the management of forest lands with respect to forage, recreational activities, wood, water, and wildlife; and career opportunities at both professional and nonprofessional levels. Twelve lessons including learning activities and resource materials are provided, organized by concept and objective, and suggestions included for additional resources. (SA)

ED 110 768 CE 004 578
PCE/K-10 Activities for Career Education, Grades K-3.
Portland Public Schools, Oreg. Area II Office.
Pub Date [Jun 73]
Note—204p.; For related documents, see CE 004 577-580
EDRS Price MF-$0.76 HC-$10.78 Plus Postage
Descriptors—*Career Awareness, *Career Education, *Curriculum Guides, Educational Objectives, Grade 1, Grade 2, Grade 3, Integrated Activities, *Integrated Curriculum, Kindergarten, Learning Activities, *Primary Education, Teaching Procedures, Units of Study (Subject Fields)
Identifiers—Oregon (Portland), PCE, *Project Career Education

Project Career Education Activities for Grades K-3 is based on the overall Area 2 (Portland, Oregon) program goals for career education which proposes that children completing school should have sufficient knowledge and competencies to enter into a field of employment or advanced training program in that field. The first section discusses the project's goals, concepts, and components, related to the total K-10 career awareness and exploration program, discussing the educational strategies of resource development, field trips, speakers, file folders, and self understanding surveys. The body of the document is divided into integrated career awareness activities for the following grade levels: kindergarten/grade 1 (with sections entitled ourselves, school, others, jobs, and making things); grade 2 (with sections entitled vocational, family, citizenship, and leisure); and grade 3 (with sections entitled health and science, music, language arts, self awareness, and social studies). For each activity the theme, grade level, curriculum area, life role, purpose, objective, material/resources, and teaching procedures are specified. The document concludes with sample activity blanks and evaluation forms. (BP)

ED 110 769 CE 004 579
PCE/K-10 Activities for Career Education, Grades 4-6.
Portland Public Schools, Oreg. Area II Office.
Pub Date [Jun 73]
Note—214p.; For related documents, see CE 004 577-580
EDRS Price MF-$0.76 HC-$10.78 Plus Postage
Descriptors—*Career Awareness, *Career Education, *Curriculum Guides, Educational Objectives, *Elementary Education, Grade 4, Grade 5, Grade 6, Health, *Integrated Activities, Integrated Curriculum, Language Arts, Learning Activities, Mathematics, Sciences, Social Studies, Units of Study (Subject Fields)
Identifiers—Oregon (Portland), PCE, *Project Career Education

The Portland (Oregon) Public School Project Career Education (PCE) Activities for grades 4-6 is based on the city's overall Area 2 program goals for career education which proposed that children completing school should have sufficient knowledge and competencies to enter into a field of employment or an advanced training program in that field. Discussed in general are the project's goals in career awareness and career exploration. The remaining sections are divided by grade levels (4-6), providing integrated career awareness activities in social studies, language arts, math, health and science, and general areas of interest. For each activity the theme, grade level, curriculum area, life role, purpose, objectives, materials/resources, and teaching procedures are outlined. The document concludes with sample teaching activity blanks and evaluation forms. (BP)

ED 112 187 CE 005 205
Learning Experiences in Technology: Integrated Teaching Unit Handbook: Book 3 for Grades 5 and 6.
Royal Oak City School District, Mich.
Report No—VT-101-982
Pub Date Jun 73
Note—326p.; For other grade levels, see CE 005 203-204
EDRS Price MF-$0.76 HC-$17.13 Plus Postage
Descriptors—Activity Units, *Career Awareness, Career Education, *Curriculum Guides, Elementary Education, Elementary School Curriculum, *Grade 5, *Grade 6, Instructional Materials, *Learning Activities, Technology
Identifiers—Project Learning Experiences in Technology, Project LET

The opportunity for grade 5-6 students to explore careers and technology is provided by the curriculum guide, which is a component of Project LET (Learning Experiences in Technology). Inherent in each component is an awareness of careers and the way man does things. The guide is intended to be used as a working copy for professional staff. The integrated teaching units are evolutionary in nature as they are developed from the curriculum, utilizing student involvement and ideas. Unit topics include: anthropology and archaeology, city planning, crafts history and products, earth study, ecology, communications, homemaking, human biology, magnetism and electricity, political system, producing and retailing, scientific reasoning, seasonal projects, theater, and writing music. (Author/VA)

ED 114 466 CE 005 108
Teacher Guide for Increasing the Career Awareness of Primary School Children; Grades 1-3. Revised Edition.
Pleasant Hill School District, Oreg.
Pub Date 10 Aug 73
Note—107p.; For related document, see CE 005 109
Available from—Pleasant Hill School District 1, Route 8, Box 750, Pleasant Hill, Oregon 97401
EDRS Price MF-$0.76 HC-$5.70 Plus Postage
Descriptors—Art, Bibliographies, *Career Awareness, Career Education, *Curriculum Guides, Health, Integrated Curriculum, Language Arts, *Learning Activities, Mathematics, Post Testing, Pretests, *Primary Education, Resource Guides, Science Units, Social Studies Units, Student Evaluation, Tests, *Units of Study (Subject Fields)

The career awareness curriculum guide for grades 1-3 provides units of instruction for the subjects of language arts, social studies, science, mathematics, and health with each unit containing concepts, behavioral objectives, suggested learning activities, and suggested materials and resources for each of the three grades. An additional unit on art is suitable for use with all three grades. The guide also provides career awareness pre- and posttests, a teacher survey form on career awareness, and a curriculum guide evaluation form for the teacher. An appendix contains sample forms and letters useful in career awareness programs, and a bibliography provides a 100-item job list for grades 1-3, a list of books for students in those grades, and a list of helpful pamphlets available to teachers. (JR)

ED 114 467 CE 005 109
Teacher Guide for Increasing the Career Awareness of Elementary Children: Grades 4-6. Revised Edition
Pleasant Hill School District, Oreg.
Pub Date 10 Aug 72
Note—180p.; For related document, see CE 005 108
Available from—Pleasant Hill School District 1, Route 8, Box 750, Pleasant Hill, Oregon 97401
EDRS Price MF-$0.76 HC-$9.51 Plus Postage
Descriptors—Art, Behavioral Objectives, Bibliographies, *Career Awareness, Career Education, *Curriculum Guides, Elementary Education, Health, Integrated Curriculum, *Intermediate Grades, Language Arts, *Learning Activities, Mathematics, Music, Resource Guides, Science Units, Social Studies Units, Student Evaluation, Tests, *Units of Study (Subject Fields)

The career awareness curriculum guide for grades 4-6 provides units of instruction for the subjects of language arts, social studies, science, mathematics, and health with each unit containing concepts, behavioral objectives, suggested learning activities, and suggested materials and resources for each of the three grades. An additional unit on music is suitable for use with all three grades. The guide also provides career awareness pre- and posttests for each grade, a teacher survey form on career awareness, and a curriculum guide evaluation form for the teacher. An appendix contains sample forms and letters useful in career awareness programs and a six-page list of job family categories. A bibliography provides a teacher resource list, a 10-page list of career awareness books in the Pleasant Hill Elementary School Library, and a list of helpful pamphlets available to teachers. (JR)

ED 114 523 95 CE 005 370
The Comprehensive Career Education System: Elementary Guidance K-6.
Educational Properties Inc., Irvine, Calif.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Grant—OEG-0-72-4578
Note—179p.; For related documents, see CE 005 371-373
Available from—Educational Properties, Inc.,

P.O. Box DX, Irvine, California 92664 ($4.50)
EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.
Descriptors—Behavioral Objectives, Career Awareness, *Career Education, Classroom Guidance Programs, *Curriculum Guides, Educational Objectives, Elementary Education, *Elementary School Guidance, Grade 1, Grade 2, Grade 3, Grade 4, Grade 5, Grade 6, Guidance Objectives, Integrated Curriculum, Kindergarten, *Learning Activities, Teaching Methods, *Units of Study (Subject Fields)
Identifiers—Orange County Consortium

Elementary guidance materials providing career education activities for grades K-6 are presented for utilization by elementary teachers and elementary guidance specialists. Arranged by grade level, materials cover the following career education concepts: appreciation and attitudes, self-awareness, decision making, career awareness, and educational awareness. Subject areas include: language arts, social studies, math, art, homemaking, science, music, and physical education. Each activity includes information on the guidance objective, materials needed, procedure, and discussion, if applicable. A variety of implementation strategies are used, including: direct student involvement, vicarious student experiences, individualized instruction, interdisciplinary approaches, and management by objectives. Modification and additional activities supplied by teachers to meet the individual needs of each school and classroom are suggested to expand the effectiveness of the guide. (LH)

ED 118 963 CE 006 536
Career Education Activity Kit, 5-6.
Wichita Public Schools, Kans.
Spons Agency—Kansas State Dept. of Education, Topeka. Div. of Vocational Education.; Office of Education (DHEW), Washington, D.C.
Pub Date Jul 74
Grant—OEG-0-73-2975
Note—451p.; For related documents, see CE 006 534-535
EDRS Price MF-$0.83 HC-$24.77 Plus Postage
Descriptors—Art, *Career Education, Curriculum Development, *Curriculum Guides, Educational Objectives, Educational Programs, *Grade 5, *Grade 6, Instructional Materials, Integrated Curriculum, Intermediate Grades, Language Arts, *Learning Activities, Mathematics, Physical Education, Sciences, Social Studies, Teaching Guides

An interdisciplinary career education program called Career Education Activity Kits (CEAK) for grades 5-6 are presented in the document. The materials in the teacher's handbook may be used as an aid to achieve pre-established instructional outcomes. Fourteen career generalizations were utilized to develop the CEAK materials. Each generalization has four career education outcome statements for developing the student's thought processess: (1) identify--activities requiring recognition from the students, (2) compare/contrast--activities providing different materials which require comparison, (3) analyze--activities requiring students to identify parts or concepts and the relationship between them, and (4) evaluate--activities requiring judgments about the concepts in the career generalization. The CEAK information sheets are presented for seven subject areas: language arts (14 activities), art (two activities), interdisciplinary (four activities), mathematics (eight activities), physical education (one activity), science (one activity), and social studies (24 activities). Each activity guideline includes a career generalization, career objectives). Each objective, materials needed, preparation, procedure, and evaluation. Worksheets, transparency masters, evaluation instruments, and other instructional materials are included. Appended materials include the 14 career generalizations and objectives, a list of Career Education Consortium participants, an explanation of the feedback system, and a teacher check list for the feedback system. (Author/EC)

ED 141 500 CE 010 920
Bowman, Judith And Others
Getting Started: A Guide to Writing Your Own Curriculum. The Pennsylvania Guide for Instructional Improvement through Career Education. Elementary Volume K-6.
Central Susquehanna Intermediate Unit 16, Lewisburg, Pa.
Spons Agency—Pennsylvania State Dept. of Education, Harrisburg. Bureau of Instructional Support Services.; Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational and Technical Education.
Bureau No—74010G
Pub Date 76
Note—461p.; For related documents see CE 010 918-921
Available from—Central Susquehanna Intermediate Unit, P.O. Box 213, Lewisburg, Pennsylvania 17837 ($15.00)
EDRS Price MF-$0.83 HC-$24.77 Plus Postage.
Descriptors—*Career Awareness, *Career Education, Course Content, Curriculum Development, *Curriculum Planning, *Educational Objectives, Elementary Education, Elementary School Guidance, Elementary School Mathematics, Elementary School Science, Elementary School Teachers, Fine Arts, *Fused Curriculum, Language Arts, *Learning Activities, Occupational Guidance, Resource Guides, Resource Materials, Skill Development, Social Studies
Identifiers—Pennsylvania

Exercises and activities for incorporating career education into the elementary school curriculum (K-6) are contained in this teacher's manual. Activities are developed for the primary, primary/intermediate, and intermediate levels for language arts (83 activities), mathematics (53), science (32), social studies (91), related arts/fine arts (68), and guidance (24). Teaching activities are written in a format which matches specific goals of school subjects with career education concerns (curriculum focus). Career education focus (DELLA Statement), estimated class time, essential resource materials, and the instructional process are outlined for each lesson. The appendix contains the following materials: DELLA Statements (generated for the Career Development Education Model), background in curriculum design, bibliography of suggested materials, interview sheet, list of career clusters, lists of career-related games and simulation, index of publishers/distributors, lists of evaluation instruments, notes on role playing and on brainstorm technique and planning field trips, sample job application form, sample resumes, supplemental resources for guidance, and bibliography of materials dealing with sex bias. (TA)

ED 141 531 08 CE 011 370
Career Education Curriculum Model. A Guide for Teachers. Grades K through 4.
Alabama State Dept. of Education, Montgomery.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 76
Note—177p.; For related documents see CE 011 369-371
EDRS Price MF-$0.83 HC-$10.03 Plus Postage.
Descriptors—*Career Awareness, *Career Education, Curriculum Development, Curriculum Guides, Educational Objectives, Elementary School Students, Fused Curriculum, Grade 1, Grade 2, Grade 3, Grade 4, *Individual Development, Kindergarten, Language Arts, *Learning Activities, Mathematics Curriculum, Models, Primary Education, Resource Guides, Resource Materials, Science Curriculum, Social Studies, Units of Study
Identifiers—Alabama

The structure of career education included in this curriculum guide for grades K-4 is intended to provide a comprehensive, sequential, and integrated approach, based on the eight elements of the Comprehensive Career Education model matrix (CCEM) adopted in Alabama. The eight elements are as follows: Self-awareness, educational awareness, career awareness, economic awareness, decisionmaking, beginning competency, employability skills, and attitudes and appreciations. Sample objectives, learning activities, and resources concerning each element are included for each grade level. The kindergarten level covers the areas of self, home, school, and community, and grades 1-4 cover language arts, math, science, and social studies. There are 8 activities for grade K, 23 for grade 1, 18 for grade 2, 14 for grade 3, and 17 for grade 4. (TA)

ED 162 894 SE 025 418
Korotkin, Arthur L. And Others
A Study of the Use of Computers in the Development of Science Career Awareness in Elementary School Children.
Gibboney (Richard A.) Associates, Inc., Kensington, Md.; Montgomery County Public Schools, Rockville, Md.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—Jul 78
Grant—NSF-SED-76-20191
Note—183p.
EDRS Price MF-$0.83 HC-$10.03 Plus Postage.
Descriptors—Autoinstructional Methods, *Career Education, *Computer Assisted Instruction, Computer Oriented Programs, Educational Research, *Elementary Education, *Instruction, *Science Careers, *Science Education, Sciences
Identifiers—*Research Reports

The Science Career Awareness Training (SCAT) program proved effective as a means of increasing knowledge about science careers and interest in science as a career for students in the late elementary school grades (grades 4-6). Thus, the SCAT program influenced the knowledge and motivation bases of career choices. However, participants in the program became more indecisive as far as career choices were concerned. Among these students, certain stereotypic career-choice behaviors were already apparent suggesting that programs such as SCAT should start even earlier. The SCAT program uses a highly-interactive, computer-based system to provide information about science career areas. The information is presented in the form of 30-minute dialogs. The dialogs present both printed information and photographs, as well as problem-solving experiences. The topics of the dialogs are: (1) science careers in general; (2) the engineer; (3) the chemist; (4) the physicist; (5) the earth scientist; (6) the biologist; (7) the mathematician; (8) the social scientist; and (9) the health scientist. (Author/BB)

Elementary

Curriculum

ED 052 067 SE 012 093

Segerstrom, Harold G.

Science for Children K-3.

New York State Education Dept., Albany. Bureau of Elementary Curriculum Development.

Pub Date 71

Note—135p.; 1971 Reprint

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Curriculum Guides, *Elementary School Science, Grade 1, Grade 2, Grade 3, *Instructional Materials, Kindergarten, *Science Activities, *Science Units

This handbook has been prepared as an aid to teachers, supervisors, and administrators as they select and organize science programs in the elementary grades. It has been organized around six large subject areas: living things; our growing bodies; air, water, and weather; the earth and its composition; the solar system and beyond; and matter and energy. The handbook is organized by grade level in each of the six major areas of study. Each unit contains: (1) purpose of the unit; (2) introduction of the unit; (3) experiences relating to the unit; (4) enrichment; (5) organization and use of information gained (projects, questions); (6) basic understandings to be gained; and (7) vocabulary. (JG)

ED 054 939 SE 012 331

COPES (Conceptually Oriented Program in Elementary Science), March 1971.

New York Univ., N.Y.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date Mar 71

Note—16p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Curriculum, *Curriculum Development, Elementary School Curriculum, *Elementary School Science, Instructional Design, Pamphlets, Science Curriculum

This 15 page booklet describes the Conceptually Oriented Program in Elementary Science (COPES). Problems encountered in science education are stated and the rationale for the conceptual schemes approach is developed to solve these problems. The purpose, objectives, and concepts of the COPES program are defined. The five main conceptual schemes upon which COPES is based are: (1) The Structural Units of the Universe; (2) Interaction and Change; (3) The Conservation of Energy; (4) The Degradation of Energy; and (5) The Statistical View of Nature. The Conservation of Energy concept is more fully developed as an example of the program. A list of staff and advisory committee members is included. (BB)

ED 064 068 SE 013 529

Pless, Herbert

Models for Teaching Science in Elementary Education.

Philadelphia Suburban School Study Council, Pa.

Pub Date 71

Note—64p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Elementary School Science, Instruction, *Instructional Materials, *Lesson Plans, Resource Units, Science Activities, *Science Units, *Teaching Procedures, Units of Study (Subject Fields)

Identifiers—Philadelphia

The publication contains descriptive outlines or graphic designs representing how different aspects of science could be taught. All representative "models" follow the same format: general purpose, behavioral objectives, background information, materials, the lesson plan, evaluation, suggested activities, references and resources. The six "models" are: A Self-Motivating Evaluative Technique in Science for the Primary Grades; An Introductory Unit on Living Things for the Primary Grades; A Discovery Approach in Teaching Aerodynamics to the Intermediate Grades; The Game as a Technique for Introducing Science Systems to the Intermediate Grades; An Open-ended Approach for Teaching the Meaning of Science to the Intermediate Grades; and An Integrated Science Lesson for the Intermediate Grades. (CP)

ED 083 044 SE 016 903

Elementary Science Guide, K-7.

Virginia State Dept. of Education, Richmond. Div. of Elementary Education.

Pub Date 72

Note—100p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Activity Learning, Course Content, Course Objectives, *Curriculum Guides, *Elementary School Science, General Science, Instructional Materials, Resource Materials, *Science Activities, Science Education, *Teaching Guides

This guide was prepared to assist elementary teachers in planning and implementing an activity-centered, conceptually-based science program. The guide consists of the following major sections: (1) Point-of-View, which sets forth a description of science, its role in the curriculum, the role of the teacher, and evaluation procedures which are compatible with a science program based on the active involvement of children in the learning process; (2) Objectives, which describes awarenesses, attitudes, skills, and understandings that should be developed through elementary science; (3) Process Skills, which identifies eleven basic skills necessary for effective "sciencing." A summary chart illustrates the interrelatedness of skills at four stages in the elementary school. Teachers can guide skill development of individual children by means of the sequence described; (4) Planning for Safety, which describes safety conditions important in the program; (5) Conceptual Areas, which outlines and classifies the major content of elementary science into the following nine conceptual areas: Adaptation, Change, Equilibrium, Interrelationships, Motion, Organization, Space, Time, and Variety. Each of the nine areas is divided into five subsections: Living Things, Matter and Energy, Earth, The Universe, and Man and Technology; and (6) Suggested Bibliography which lists professional books for science in the elementary school. (Authors/JR)

ED 086 502 SE 016 966

Rogers, Arnold R., Ed.

Project Earth, A Curriculum Guide, Kindergarten-Primary-Intermediate.

Cranston School Dept., R.I.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Jan 71

Note—70p.; A conservation Education Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Air Pollution Control, *Curriculum, Ecology, *Elementary School Science, *Environmental Education, Guides, *Instructional Materials, Objectives, Soil Conservation, *Teaching Guides, Water Resources

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This conservation curriculum guide contains units on the air, water, soil, plants, and animals. The guide is organized by grade levels--kindergarten, primary, intermediate. Objectives and concepts are listed and suggested activities are complete with a statement of procedure and necessary materials. A resource appendix includes books, films, and filmstrips. This work was prepared under an ESEA Title III contract. (LS)

ED 087 912 95 CE 001 008

English, Math, Science, Social Studies. Curriculum Guides for Kindergarten.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date [73]

Note—99p.; See also CE 001 005-7, CE 001 009-17, CE 001 075-84

EDRS Price MF-$0.75 HC-$4.20

Descriptors—Audiovisual Aids, *Career Education, *Curriculum Development, *Curriculum Guides, *Educational Objectives, English, *Kindergarten, Mathematics, Personal Growth, Sciences, Social Studies, Teaching Methods

Identifiers—Career Awareness, Texas

The purpose of this curriculum guide is to help the kindergarten teacher in his endeavor to fulfill his teaching responsibilities. Space is provided for teachers' additions, deletions, notes and criticisms which will be useful when the guide is revised. The guide is sectioned according to subject matter (English, math, science, and social studies). Vertical columns are arranged for each subject area relating the curriculum concepts to: curriculum performance objective, bilingual, suggested curriculum teaching methods, career awareness, character education, and audio-visual and resource materials. Six pages of audio-visual source information comprise the appendix to the guide. (DS)

ED 087 913 95 CE 001 012

English, Math, Science, Social Studies. Curriculum Guides for the Fourth Grade.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date [73]

Note—257p.; See also CE 001 005-11, CE 001 013-17, CE 001 075-84

EDRS Price MF-$0.75 HC-$12.60

Descriptors—Audiovisual Aids, *Career Education, *Curriculum Development, *Curriculum Guides, *Educational Objectives, English, *Grade 4, Instructional Aids, Mathematics, Personal Growth, Sciences, Social Studies, Teaching Methods

Identifiers—Career Awareness, Texas

The purpose of this curriculum guide is to help the fourth grade teacher in his endeavor to fulfill his teaching responsibilities. Space is provided for teacher's additions, deletions, notes and criticisms which will be useful when the guide is revised. The guide is sectioned according to subject matter (English, math, science, and social studies). Vertical columns are arranged for each subject area relating the curriculum concepts to: curriculum performance objective, bilingual, suggested curriculum teaching methods, career awareness, character education, and audio-visual and resource materials. The guide closes with a 43-page section of instructional aids and 29 pages of audio-visual source information. (DS)

ED 087 914 95 CE 001 013

Language Arts, Math, Science, Social Studies. Curriculum Guides for the Third Grade.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date [73]

Note—248p.; See also CE 001 005-12, CE 001 014-17, CE 001 075-84

EDRS Price MF-$0.75 HC-$11.40

Descriptors—Audiovisual Aids, Career Education, *Curriculum Development, *Curriculum Guides, *Educational Objectives, English, *Grade 3, Instructional Aids, Mathematics, Personal Growth, Sciences, Social Studies, Teaching Methods

Identifiers—Career Awareness, Texas

The purpose of this curriculum guide is to help the third grade teacher in his endeavor to fulfill his teaching responsibilities. Space is provided for teacher's additions, deletions, notes and criticisms which will be useful when the guide is revised. The guide is sectioned according to subject matter (English, math, science, and social studies). Vertical columns are arranged for each subject area relating the curriculum concepts to: curriculum performance objective, bilingual, suggested curriculum teaching methods, career awareness, character education, and audio-visual and resource materials. The guide closes with 27 pages of teaching aids and 34 pages of audio-visual source information. (DS)

ED 087 915 95 CE 001 014
English, Math, Science, Social Studies. Curriculum Guides for Second Grade.
Harlandale Independent School District, San Antonio, Tex. Career Education Center.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.
Pub Date [73]
Note—180p.; See also CE 001 005-13, CE 001 015-17, CE 001 075-84
EDRS Price MF-$0.75 HC-$9.00
Descriptors—Audiovisual Aids, *Career Education, Curriculum Development, *Curriculum Guides, *Educational Objectives, English, *Grade 2, Mathematics, Personal Growth, Sciences, Social Studies, Teaching Methods
Identifiers—Career Awareness, Texas

The purpose of this curriculum guide is to help the second grade teacher in his endeavor to fulfill his teaching responsibilities. Space is provided for teacher's additions, deletions, notes and criticisms which will be useful when the guide is revised. The guide is sectioned according to subject matter (English, math, science, and social studies). Vertical columns are arranged for each subject area relating the curriculum concepts to: curriculum performance objective, bilingual, suggested curriculum teaching methods, career awareness, character education, and audio-visual and resource materials. The guide closes with an eighteen-page section of visual aid examples and fourteen pages of audio-visual source information. (DS)

ED 087 916 95 CE 001 015
English, Math, Science, Social Studies. Curriculum Guides for the First Grade.
Harlandale Independent School District, San Antonio, Tex. Career Education Center.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.
Pub Date [73]
Note—133p.; See also CE 001 005-14, CE 001 016-17, CE 001 075-84
EDRS Price MF-$0.75 HC-$6.60
Descriptors—Audiovisual Aids, *Career Education, Check Lists, *Curriculum Development, *Curriculum Guides, *Educational Objectives, English, *Grade 1, Mathematics, Personal Growth, Sciences, Social Studies, Teaching Methods
Identifiers—Career Awareness, Texas

The purpose of this curriculum guide is to help the first grade teacher in his endeavor to fulfill his teaching responsibilities. Space is provided for teacher's additions, deletions, notes and criticisms which will be useful when the guide is revised. The guide is sectioned according to subject matter (English, math, science, and social studies). Vertical columns are arranged for each subject area relating the curriculum concepts to: curriculum performance objective, bilingual, suggested curriculum teaching methods, career awareness, character education, and audio-visual and resource materials. The guide closes with a ten page section of audio-visual source information. (DS)

ED 091 174 SE 017 513
Science: Grade 6. Curriculum Bulletin, 1971-72 Series, No. 6.
New York City Board of Education, Brooklyn, N.Y. Bureau of Curriculum Development.
Pub Date 72
Note—256p.
Available from—New York Board of Education, Publications Sales Office, 110 Livingston Street, Brooklyn, New York 11201 ($4.00)
EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—Biology, Curriculum Guides, *Elementary School Science, General Science, *Grade 6, *Instructional Materials, Physical Sciences, Science Activities, Science Education, *Teaching Guides
Identifiers—New York City

This publication contains an extensive introduction for teachers covering such topics as questioning, reading in the science program, evaluation, and audiovisual materials. The book itself is a teacher's guide and is based on the concept that learning is best facilitated by providing meaningful problems which the learner is able to solve. Topics covered include light and the camera, magnets, the stars, molecules and atoms, air, plants and tools scientists use. A two-level bibliography (for pupils, for teachers) is also included. (BB)

ED 091 222 88 SE 017 801
Science, Scope and Sequence, Grades 1-4.
Iberville Parish Schools, Plaquemine, La.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Louisiana State Dept. of Education, Baton Rouge.
Pub Date [74]
Note—117p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Biology, *Curriculum Guides, Earth Science, *Elementary School Science, *Individualized Instruction, Physical Sciences, *Science Curriculum, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Louisiana

This curriculum guide contains an outline of the scope and sequence of science concepts to be developed in grades 1-4 in the schools of the Iberville Parish system, Louisiana. Concepts from the life sciences, earth sciences, and physical sciences are presented in the form of an individualized instructional program in which the material within each science area is grouped according to level of complexity. The guide was teacher developed and intended for use in lesson planning as well as for providing comprehensiveness and continuity for the science program. (PEB)

ED 093 575 SE 016 484
Peeler, Mantha And Others
Science, Grades 1-6, Curricular Guide.
York County School District 3, Rock Hill, S.C.
Pub Date [74]
Note—72p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Curriculum Design, *Curriculum Guides, *Elementary School Science, *General Science, Science Education
Identifiers—South Carolina

This curricular guide, designed for grades one through six, was prepared by a writing committee from the Rock Hill, South Carolina, public schools. Five major themes (living things, the earth, matter and energy, the universe, the human body) provide continuity and direction for the elementary school science program. The guide contains a list of objectives for teaching elementary school science; a statement of the philosophy underlying the program; as well as lists of major concepts, filmstrips, and activities for each one of the five themes as it is developed at each of the six grade levels. The guide also includes a brief section on methods of evaluation, a discussion of safety in the science program, and a list of resources categorized as books and as community resources. (PEB)

ED 093 641 88 SE 017 329
Laboratory Science in Clover. Curriculum Guide Grades 4-7.
Clover School District, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 73
Note—66p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Behavioral Objectives, *Curriculum Guides, *Elementary School Science, Inquiry Training, Instruction, *Instructional Materials, Science Curriculum, Science Education, *Teaching Guides
Identifiers—Clover School District, Elementary Secondary Education Act Title III, ESEA Title III, South Carolina

This curriculum guide provides a laboratory approach to teaching elementary school science. A set of both cognitive and affective objectives is presented. Beginning with grade level 4, conceptual schemes for each level, with accompanying subconcepts, are presented, and a complete list of behavioral objectives associated with the conceptual schemes is included. A list of suggested activities relating to the specific schemes is also included for each grade level. The program for grades 4, 5, and 6 is referred to as Experimental Science Program. For seventh grade, it is the Life Science Program. In this program emphasis is placed on the cognitive level of the learners. The program is planned on a modular basis, allowing different children to engage in different activities at the same time. Objectives and activities are cited, as well as reference resources. Desirable outcomes of the program are itemized. The guide includes special teaching hints, general safety practices, an exportability report, and an itemized implementation report. (EB)

ED 093 687 SE 018 008
Seaford School District Science Guide.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 73
Note—100p.
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($2.00, make checks payable to the Del Mod System)
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Curriculum Guides, *Elementary School Science, General Science, Instruction, *Instructional Materials, *Junior High School Students, *Kindergarten, Psychomotor Skills, Science Education, Scientific Concepts, Teaching Guides
Identifiers—*Del Mod System

This monography presents the concepts to be presented, the psychomotor skills through to pertain to all the concepts, the process skills required, and the values and attitudes hoped to be developed for a science curriculum, K through 8. A list of suggested field trips accompanies each syllabus. At the kindergarten through grade 6 levels, scientific concepts are presented concerning Animal and Plant Biology, Health and Nutrition, Earth and Space Science, Matter and Energy, as well as some general concepts of Measurements. A more detailed course outline is presented for levels seven and eight. In level seven, greater emphasis is placed on such concepts as Evolution, Genetics and Interdependency, in the biological sciences and Forms of Energy, and Simple Mechanics for the physical sciences. Attention is given to careers in science, great names in science and the measurement system in both levels seven and eight. The psychomotor skills, process skills and affective skills suggested are also directed toward both levels. Earth and Space science, including Oceanography, is developed as level eight. (EB)

ED 093 699 95 SE 018 068
Brown, Emmagene L. And Others
Science 2. De Soto Parish Curriculum Guide.
DeSoto Parish School Board, Mansfield, La.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Aug 71
Note—209p.
EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE
Descriptors—Biology, *Curriculum Guides, Earth Science, Electricity, *Elementary School Science, Grade 2, Instructional Materials, Magnets, *Science Curriculum, *Science Instruction, *Teaching Guides, Teaching Techniques
Identifiers—Elementary Secondary Education Act Title I, ESEA Title I

This guide is designed to provide teachers (grade 2) with a ready resource for planning, organizing, and teaching science to the elementary child. Many suggested activities will provide an enriched science program. Each unit lists estimated time, content, concepts or "understandings," problems to deal with, activities, suggestions for evaluation, audiovisual aids, and additional references. The topic headings of the 11 units are as follows: Seasons; We Do Work; Sounds and Senses; Trees, Rocks and Minerals; The Big Round Earth; The Earth's Gravity; Electricity; Work and Play with Magnets; Animal Babies, and Good Food; Good Teeth. The units were written primarily for second graders, but many of the activities would be appropriate at other elementary grade levels. (JP)

ED 095 695 EC 062 889

Morse, Margaret And Others

The Development and Implementation of a Minimum Objective System in the Hinesburg Elementary School. Hinesburg Elementary School Minimum Objectives for Science, Physical Education, Music, Library. Appendix B: Vol. 3.

Chittenden South School District, Shelburne, Vt.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.; Vermont State Dept. of Education, Montpelier. Div. of Special Education and Pupil Personnel Services.

Pub Date 74

Note—250p.; For the report and related appendixes see EC062887, EC062888 and EC062890

EDRS Price MF-$0.75 HC-$11.40 PLUS POSTAGE

Descriptors—*Behavioral Objectives, Course Objectives, Curriculum Guides, *Exceptional Child Education, Libraries, *Music, *Physical Education, *Sciences

The appendix to the report of the minimum objective system of the Hinesburg Elementary School (Vermont) includes objectives for science, physical education, music, and library skills, from the kindergarten through grade 6 levels. Most objectives are presented in the format of condition (or task), student behavior, and criteria. Also included are schedules for curriculum activities throughout the year at each grade level. Graphs to help monitor student progress are given. The following types of objectives are included: life sciences, earth sciences, physics, physical education games of low organization, basketball, wrestling, gymnastics, singing, listening to music, and library skills. (DB)

ED 104 860 SP 009 098

Cleminson, Ronald W. And Others

Guidelines and Competencies for Elementary Science Education: A Course Module.

MSS Information Corp., New York, N.Y.

Pub Date 74

Note—88p.

Available from—MSS Information Corporation, 655 Madison Avenue, New York, New York 10021 ($3.75, 20 percent discount in orders of $200.00 or more)

EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE

Descriptors—Curriculum, Elementary Education, *Performance Based Teacher Education, *Performance Criteria, *Science Instruction, *Teacher Education, *Teaching Skills

This three-part document contains a set of competencies for elementary science teachers. The objectives state the level of competency expected and suggest how it may be achieved. The first section, "Process-Inquiry Skills," discusses competencies fundamental for elementary teachers and children. The second section, "Instructional Skills," is designed to help teachers develop skills in planning for and teaching elementary school science by the inquiry approach. The third section, "Interest and Research/Curriculum Knowledge," provides the background in science education necessary to support this approach to teaching and to nurture an interest in science. Instructions for completing each competency are contained in a module. Students are responsible for selecting activities or methods included in the modular framework to complete each competency satisfactorily. (Authors/JS)

ED 108 940 SE 019 220

Stapleton, Richard J.

Elementary Science Program.

Wappingers Central School District 1, Wappingers Falls, N.Y.

Pub Date Jan 75

Note—27p.

EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE

Descriptors—Behavioral Objectives, Biological Sciences, *Curriculum Development, Earth Science, Elementary Education, *Elementary School Science, Environmental Education, Physical Sciences, *Program Descriptions, Science Education

Identifiers—New York

Presented is an elementary school science program designed to offer a basic continuum of process objectives and concepts. A brief history of the development of the Wappingers Central School District's Elementary Science Committee is presented to help lay the groundwork for the redesigning of the science program described. Potential advantages hoped to be accrued are listed and goals are presented. The scope and sequence of the program is described in both narrative and schematic form. Each major concept is presented and objects for each grade level, K through six, are included. Experiences relating to the scope and sequence of the program are related to New York State Guides—"Science for Children." (Author/EB)

ED 118 418 SE 020 239

Teaching Science in the Elementary School. Bulletin No. 276.

Montgomery County Board of Education Rockville, Md.

Report No—Bull-276

Pub Date [illegible]

Note—185p.; Occasional light print

EDRS Price MF-$0.83 HC-$10.03 Plus Postage

Descriptors—Curriculum Development, *Curriculum Guides, Elementary Education, *Elementary School Science, Instruction, *Instructional Materials, *Program Guides, *Science Activities, Science Education, Teaching Guides

This publication provides guidelines for the operation of an elementary school (K-6) science program curriculum. The report describes the science program which was developed and is in operation in the Montgomery County Public School District (Rockville, Maryland). An emphasis of the program is to maintain continuity between all levels of the school science curriculum. To provide this, an overview of the entire science program is presented, along with sections listing instructional activities, science materials, textbooks, and equipment for each of the three two-year "frameworks" which make up the total program. Appendices list annotated library titles under appropriate content areas as well as library resource books, textbooks, pamphlets, and teacher's guides which are most helpful to instructors in the program. (CP)

ED 132 044 . SE 021 711

Ferguson, Thomas A. Repass, Susan O.

Developing a Science Program for Kindergarten Children.

Pub Date 1 Dec 75

Note—31p.; A Science Teaching Achievement Recognition (STAR) award winning paper

EDRS Price MF-$0.83 HC-$2.06 Plus Postage.

Descriptors—Activities, Bibliographies, Educational Resources, Elementary Education, *Elementary School Science, Kindergarten, Resource Guides, *Science Activities, *Science Education, Science Experiments, *Science Projects

This paper outlines a project for developing a comprehensive volume devoted to concrete teaching ideas, resources, strategies, and activities relating to science education for elementary school students and teachers. An extensive bibliography of existing references on science activities and resources is included. (SL)

ED 134 461 SE 021 939

Science Curriculum Guide, Levels 1 and 2.

Newark School District, Del.

Pub Date Sep 75

Note—158p.; For related documents, see SE 021 940-941; Contains marginal legibility; Bibliography has been removed due to marginal legibility

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Curriculum Guides, Educational Objectives, *Elementary School Science, *Elementary Secondary Education, Enrichment Activities, General Science, Intermediate Grades, Primary Education, *Science Activities, *Science Curriculum, Science Education, Scientific Concepts, Secondary School Science

The first two of four levels in a K-12 science curriculum are outlined. In Level 1 (grades K-2) and Level 2 (grades 3-5), science areas include the study of living things, matter and energy, and solar system and universe. Conveniently listed are page locations for educational and instructional objectives, cross-referenced to science area and coded for concept. Six major themes provide the basis for study in all levels (K-12). These are: Change, Continuity, Diversity, Interaction, Limitation, and Organization. Coded objectives are included for each theme. Activities are suggested for particular objectives selected from the areas of science listed above and emphasizing scientific processes. Listed for each group of objectives are notes that provide information regarding associated career emphasis, possible community resources, reading enrichment, field trips, films, role-play situations, etc. The appendices include: Appendix I, recommended time allotments for science (K-8); Appendix II, annotated list of suggested science references (COPES, ESS, SCIS, SAPA, ESSP); Appendix III, general goals of a career-science curriculum; Appendix IV, a written statement regarding non-science theory in science instruction; and Appendix V, an explanation of how to incorporate science into the reading program and develop skills in reading science literature. (CS)

ED 134 462 SE 021 940

Science Curriculum Guide, Level 3.

Newark School District, Del.

Pub Date Sep 75

Note—202p.; For related documents, see SE 021 939-941; Contains marginal legibility in Appendices; Bibliography removed due to marginal legibility

EDRS Price MF-$0.83 HC-$11.37 Plus Postage.

Descriptors—*Curriculum Guides, Educational Objectives, Elementary School Science, Elementary Secondary Education, Enrichment Activities, General Science, Junior High Schools, *Science Activities, *Science Curriculum, Science Education, Scientific Concepts, *Secondary School Science

The third of four levels in a K-12 science curriculum is outlined. In Level 3 (grades 6-8), science areas include life science, earth science, and physical science (physics and chemistry). Conveniently listed are page locations for educational and instructional objectives, cross-referenced to science area (i.e., life science, animals, genetics) and coded for concept. Six major themes provide the basis for study in all levels (K-12). These are: Change, Continuity, Diversity, Interaction, Limitation, and Organization. In Level 3, all six themes are grouped within a science area. Coded objectives are included for each theme. Activities emphasizing science processes are suggested for each objective. (CS)

ED 138 442 SE 022 025

Hausman, Howard J.

Choosing a Science Program for the Elementary School. Occasional Papers Number Twenty-Four.

Council for Basic Education, Washington, D.C.

Pub Date Oct 76

Note—51p.

Available from—Council for Basic Education, 725 Fifteenth St., N.W., Washington, D.C. 20005 ($1.00 ea., $0.80 for 20 or more)

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—*Curriculum, *Curriculum Planning, Elementary Education, *Elementary School Science, Instruction, *Instructional Materials, Philosophy, Process Education, Science Education, *Science Programs

This monograph deals with the kinds of elementary school science programs available today and how schools might go about choosing among them. The author advocates that every elementary school should have science classes for three or more periods each week; elementary school science is best taught as a "hands-on" subject; elementary science activities should be taught by the regularly assigned teacher in a self-contained classroom; elementary science activities should be aligned to progression of elementary skills, knowledge, and concepts, and non-textbook programs should be employed, or if textbooks are utilized, frequent science activities for all children should be embedded in the science program. (Author/SL)

ED 139 522 PS 009 280
Holt, Bess-Gene
Science with Young Children.
National Association for the Education of Young Children, Washington, D.C.
Pub Date 77
Note—137p.
Available from—National Association for the Education of Young Children, 1834 Connecticut Avenue, N.W., Washington, D.C. 20009 ($3.25, plus $.33 postage and handling)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—Community Resources, Discovery Processes, Early Childhood Education, Ecology, *Educational Objectives, *Elementary School Science, *Learning Activities, Parent Role, *Science Education, Science Materials, Teacher Role, *Teaching Guides, *Teaching Methods

Chapter I provides a rationale for teaching science to young children; Chapter II discusses various ways children can learn science concepts; Chapter III gives suggestions on collecting and making materials and equipment, arranging the science area, planning outdoor learning, making science experiences happen, asking questions, etc. Chapter IV discusses the content of young children's science and includes ideas on environmental learning, specific activities, and approaches to teaching. (MS)

ED 180 838 SE 029 847
Proposed Competencies for Elementary School Science in Pennsylvania.
Pennsylvania State Dept. of Education, Harrisburg. Bureau of Curriculum Services.
Pub Date—79
Note—26p.
Pub Type— Guides - Non-Classroom (055)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Academic Standards, *Accountability, Attitudes, *Competence, Elementary Education, *Elementary School Science, *Elementary School Students, Guidelines, Objectives, Performance Based Education, Process Education, Science Curriculum, *Science Education, *Science Instruction, Teaching Methods

Competencies considered most desirable for elementary school science in Pennsylvania are identified. These relate to student attitudes, skills (processes), and knowledge (content), considered attainable by the average student by the end of the elementary grades. The items draw from already existing science materials, the Investigative Science in Elementary Education Committee, and reviews of the document by educators. (Author/SA)

ED 188 929 SE 031 445
Wieland, Anne And Others
Elementary Science Guide – 1st Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—114p.; For related documents, see SE 031 444-450.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 1, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 1. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Four units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Magnets, Air, Plants and Animals, and Weather and Climate. (CS)

ED 188 930 SE 031 446
Wieland, Anne And Others
Elementary Science Guide – 2nd Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—115p.; For related documents, see SE 031 444-450.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 2, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 2. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Four units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Atoms and Molecules, Plants and Animals, Sound, and Force and Motion. (CS)

ED 188 931 SE 031 447
Wieland, Anne And Others
Elementary Science Guide – 3rd Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—75p.; For related documents, see SE 031 444-450.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 3, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 3. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Six units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Electricity, Force-Motion and Machines, Weather, Sink or Float, Mystery Powders, and Plants and Animals. (CS)

ED 188 932 SE 031 448
Wieland, Anne And Others
Elementary Science Guide – 4th Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—118p.; For related documents, see SE 031 444-450.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 4, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 4. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Four units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Colored Solutions, Plants and Animals, Atoms and Molecules, and Earth Science - Rocks. (CS)

ED 188 933 SE 031 449
Wieland, Anne And Others
Elementary Science Guide – 5th Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—76p.; For related documents, see SE 031 444-450.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 5, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 5. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Six units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Experiments with Paper and Ice Cubes, Small Things, Electricity, Magnets, Atoms and Molecules, Plants and Animals, and Ecosystems. (CS)

ED 188 934 SE 031 450
Wieland, Anne And Others
Elementary Science Guide – 6th Grade.
Anchorage Borough School District, Alaska.
Pub Date—78
Note—117p.; For related documents, see SE 031 444-449.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Grade 6, *Resource Materials, Science Course Improvement Projects, *Science Curriculum, Science Education, Teaching Guides, Worksheets

Presented is a resource book to be used with instructional kits for elementary school science students, grade 6. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Six units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Kitchen Physics, Mealworms, Environment of Flowering Plants and Their Seeds, Properties of Water, Atoms and Molecules, and Batteries and Bulbs II. (CS)

ED 191 663 SE 031 634
Science Curriculum Guide: Topics, Concepts, Objectives, K-8, 1980.
Northern Valley School District, Closter, N.J.
Pub Date—80
Note—46p.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Curriculum Development, *Curriculum Guides, Elementary Education, *Elementary School Science, Junior High Schools, *Science Curriculum, Science Education, *Scientific Concepts

The purpose of this guide is to provide a clear outline of scope, concepts, and objectives of a kindergarten through eighth-grade science program which can serve as a base for the development and articulation of science curriculum within and among the eight school districts in the Northern Valley region, New Jersey. The scope and sequence of topics are defined, grade-by-grade. For each grade, specific concepts are listed as is the objective for each concept. (DS)

ED 191 675 SE 031 745
Program of Studies–Science, K-8.
Montgomery County Public Schools, Rockville, Md. Dept. of Instructional Planning and Development.
Pub Date—79
Note—20p.; For related document, see SE 031 746.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Biological Sciences, *Course Objectives, Elementary Education, *Elementary School Science, Junior High Schools, Physical Sciences, Science Course Improvement Projects,

*Science Curriculum. Science Education. Science Instruction

Described is the kindergarten through eighth-de science program of the Montgomery County lic Schools. Rockville. Maryland. This program places emphasis on biological science and physical science. Involved are activities selected from several sources, which emphasize the processes of science, the nature of science, and the substance of science. Emphasis is given to an activity-centered classroom, where the children learn through their own experiences with materials and investigations selected and designed to take advantage of their natural curiosity. The K-8 program is described with a listing of substantive topics, sources of materials and activities, and a short statement encorporating instructional objectives. (DS)

ED 191 692 **SE 031 776**

Kelner, Bernard G. Hofkin, Fred M.

Key Competencies, Science Education: Secondary Schools (Junior High, J-G Sci) (Senior High, S-Bio).

Philadelphia School District, Pa. Office of Curriculum and Instruction.

Pub Date—80

Note—63p.; For related document, see SE 031 775.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Behavioral Objectives, Biology, *Board of Education Policy, Competency Based Education, General Science, Junior High Schools, *Science Curriculum, Science Education, *Science Instruction, Secondary Education, *Secondary School Science

Presented is a list of behavioral objectives which can be used to evaluate mastery of the competency of students in junior high school science and senior high school biology. These competencies were prepared by the School District of Philadelphia. The lists are comprehensive and coded for easy reference. (CS)

Elementary

Earth/Space/Meteorology/Oceanography

ED 021 745 SE 004 823
Hubbell, Laurence
INVESTIGATING SCIENCE WITH CHILDREN, VOLUME 2, THE EARTH.
National Aeronautics and Space Administration, Washington, D.C.; National Science Teachers Association, Washington, D.C.
Pub Date 64
Note—96p.
Available from—Teachers Publishing Corporation, 23 Leroy Avenue, Darien, Connecticut 06820.
EDRS Price MF-$0.50 HC Not Available from EDRS.
Descriptors—*EARTH SCIENCE, *ELEMENTARY SCHOOL SCIENCE, GEOLOGY, *INSTRUCTIONAL MATERIALS, LABORATORY EXPERIMENTS, *SCIENCE ACTIVITIES, *TEACHING GUIDES
Identifiers—Investigating Science With Children, National Aeronautics and Space Administration, National Education Association, National Science Teachers Association

This is the second in a series of guidebooks written for elementary school teachers to help improve their science teaching. The book emphasizes processes of science and creativity as well as science content. The book is divided into three sections–the atmosphere, the lithosphere, and the hydrosphere.* Each chapter begins with simple concepts, and leads to more complex concepts. (BC)

ED 042 638 SE 009 754
[Environmental Education Units.] Soil Sampling. Stream Profiles. Tree Watching. Plant Puzzles.
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—90p.
EDRS Price MF-$0.50 HC-$4.60
Descriptors—Biology, *Earth Science, *Ecology, Elementary School Science, *Environmental Education, *Instruction, *Instructional Materials, Outdoor Education, Soil Science
Identifiers—ESEA Title III

Five of these eleven units describe methods elementary school students can use when studying soil characteristics. Soil nitrogen and water holding capacity tests are included with two techniques for measuring soil pH. Survey methods for soil organisms are suggested. The remaining pamphlets describe diverse activities associated with field environmental studies. Techniques for measuring slopes, drawing profiles and contours and for calculating water-shed run off are detailed and illustrated. Detailed studies of a single tree are suggested to make children aware of interdependence in nature. An outdoor activity investigating many individuals of one plant species designed to stress individual variation is described. Background information for the teacher, and instructions for making some of the apparatus, are included. This work was prepared under an ESEA Title III contract. (AL)

ED 042 645 SE 009 786
Snow and Ice.
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—37p.
EDRS Price MF-$0.25 HC-$1.95
Descriptors—Biology, *Earth Science, Ecology, *Elementary School Science, *Instructional Materials, *Outdoor Education, Physics, Science Activities, *Teaching Guides
Identifiers—ESEA Title III

This experimental edition provides a number of activities useful for investigating snow and ice with elementary school children. Commencing with games with ice cubes, the activities lead through studies of snowflakes, snowdrifts, effects of wind and obstacles on the shape and formation of drifts, to a study of animals living under snow. The emphasis is on involving children in discussions concerning the need for careful recording of observations to reach valid conclusions. Important ecological effects, such as the insulation afforded by snow, are stressed. Additional activities concerning temperature effects and suggestions for relating snow studies to other curricula areas are included. Necessary meteorological information is supplied for the teacher. This work was prepared under an ESEA Title III contract. (AL)

ED 046 735 SE 010 519
Chapman, Frank L.
The Sea and Its Boundaries.
Carteret County Public Schools, Beaufort, N.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—31p.
Available from—Regional Marine Science Project, Carteret County Public Schools, Beaufort, N.C. 28516 (Free)
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—Curriculum Guides, Earth Science, *Ecology, *Elementary School Science, Environmental Education, *Instructional Materials, Natural Resources, *Oceanology, *Textbooks
Identifiers—ESEA Title III

This publication is designed for use as part of a curriculum series developed by the Regional Marine Science Project. As an informative text for a three-week unit in marine science for grade eight, it presents a study of coastal processes and oceanography. An ecological approach to nature is emphasized, stressing the ties between culture, economy, and resource use. Topics are divided into three units: Physical Oceanology covers tides; The Sea at Its Boundary discusses waves, beaches, and man's control of the beach environment; and Beyond the Land describes the off-coast profile, elements in the water, winds, currents, and sea testing equipment. Each unit includes a vocabulary, fill-in questions, discussion topics, and activities to complete. Numerous diagrams illustrate topics discussed. This work was prepared under an ESEA Title III contract. (BL)

ED 062 164 SE 013 613
Teacher's Guide for SST_T_T (Sound, Sense, Today, Tomorrow, Thereafter).
Federal Aviation Administration, Washington, D.C.
Pub Date 69
Note—69p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Acoustics, *Aerospace Education, *Elementary Grades, Environmental Education, Environmental Influences, Instructional Materials, Learning Activities, *Teaching Guides

Offered in this teacher's guide are activity suggestions, research ideas, discussion questions, and problems to solve dealing with aviation education. Topical areas consider sound and the environment, changes and adjustments in sounds, planning and control of noise, communications, economies, and mathematical and scientific aspects of sound and noise. Several short stories and a poem appropriate for the elementary grades are presented together with follow-up activities for each selection. Completing the guide are resources for classroom and student use including books, motion pictures, filmstrips, publications, sources for airplane photographs, and a glossary of terms. (BL)

ED 067 218 SE 009 291
Foster, Albert B. Fox, Adrian C.
Teaching Soil and Water Conservation: A Classroom and Field Guide.
Soil Conservation Service (USDA), Washington, D.C.
Report No—PA-341
Pub Date Aug 70
Note—32p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Conservation Education, *Elementary Grades, Environmental Education, Field Studies, Instructional Materials, *Learning Activities, Natural Resources, *Soil Conservation, Teaching Guides, *Water Resources

Compiled in this booklet are 22 activities designed to develop awareness of the importance of conservation and the wise use of soil and moisture on croplands, grasslands, and woodlands. They have been selected by Soil Conservation Service (SCS) personnel and consultants to show that the way we manage our basic natural resources, soil and water, and their products, is important in determining our present and future welfare. The practical suggestions will aid teachers in carrying out activities and observations in the classroom and out-of-doors, mostly on the school grounds or in the community. Each activity is presented in two parts: a how-to-do-it part and an interpretation. The first is written in a language and style for presentation to students, outlining steps to follow to carry out the activity. The second part, interpretation, gives background information and explanation of procedures where necessary. Numerous pictures and diagrams supplement the narrative material. This guide is recommended for use with "An Outline for Teaching Conservation in Elementary Schools," SE 014 226. (BL)

ED 075 217 SE 015 885
Activities for Studying Streams, Grade Level 5-6. Environmental Education Series, Bulletin No. 247-A.
Montgomery County Public Schools, Rockville, Md.
Report No—Bull-247-A
Pub Date [70]
Note—13p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Curriculum Development, *Elementary Grades, *Environmental Education, Instructional Materials, *Learning Activities, Natural Resources, Outdoor Education, *Teaching Guides, Units of Study (Subject Fields), *Water Resources

This bulletin is one in a series of environmental education activity guides for grades K-12, developed and field-tested by teachers in the Montgomery County (Maryland) Public Schools. Primarily for use in the middle grades four through six, the guides are not intended to constitute complete units in themselves. They are, rather, a compilation of activities considered appropriate for particular environmental studies. In this guide about streams, for grades five and six, are activities entitled: Measuring Rate of Stream Flow, Measuring Stream Width, Measuring Stream Depth, Measuring Stream Volume, Calculating the Capacity of a Stream to Support Human Life, Measuring Stream Temperature, Measuring the pH, Constructing Collection Nets, Collecting Specimens, and Identifying Specimens. Each activity indicates the instructional objective, procedures to follow, and materials required. Teacher notes are added when necessary. A student evaluation sheet concludes the bulletin. Related documents in the series are SE 015 886 through SE 015 893. (BL)

ED 075 219 SE 015 887
Activities for Studying Weather, Grade Level 4-6. Environmental Education Series, Bulletin No. 247-C.
Montgomery County Public Schools, Rockville, Md.
Report No—Bull-247-C
Pub Date [70]
Note—14p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Curriculum Development, *Elementary Grades, *Environmental Education, Instructional Materials, *Learning Activities, *Meteorology, Natural Resources, Outdoor Education, *Teaching Guides, Units of Study (Subject Fields)

This bulletin is one in a series of environmental education activity guides for grades K-12, developed and field-tested by teachers in the Montgomery County (Maryland) Public Schools. Primarily for use in the middle grades four through six, the guides are not intended to constitute complete units in themselves. They are, rather, a compilation of activities considered appropriate for particular environmental studies. In this guide about the weather, for grades four through six, are activities entitled: Observing Weather, Understanding Humidity, Measuring Humidity, Relating Humidity to Other Elements of Weather, Constructing a Barometer, Using a Barometer to Measure Air Pressure, Constructing a Weather Vane, Using a Weather Vane to Find Wind Direction, and Weather Predicting. Indicated for each activity are the instructional objective, procedures to follow, and materials required. Teacher notes are added when necessary. A student evaluation sheet concludes the bulletin. Related documents in the series are SE 015 885 through SE 015 886 and SE 015 888 through SE 015 893. (BL)

ED 075 221 **SE 015 889**
Activities for Studying Rocks and Soil. Grade Level 4-6. Environmental Education Series, Bulletin No. 247-E.
Montgomery County Public Schools, Rockville, Md.
Report No—Bull-247-E
Pub Date [70]
Note—16p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Curriculum Development, *Elementary Grades, *Environmental Education, *Geology, Instructional Materials, *Learning Activities, Natural Resources, Outdoor Education, *Teaching Guides, Units of Study (Subject Fields)

This bulletin is one in a series of environmental education activity guides for grades K-12, developed and field-tested by teachers in the Montgomery County (Maryland) Public Schools. Primarily for use in the middle grades four through six, the guides are not intended to constitute complete units in themselves. They are, rather, a compilation of activities considered appropriate for particular environmental studies. In this guide about rocks and the soil, for grades four through six, activities are entitled: Collecting Rock Samples for Observation and Classification, Testing Rocks for Hardness, Classifying Rocks, Observing the Weathering Action of Water on Rocks, Breaking Down Rocks by Freezing, Demonstrating the Effect of Rainfall on Soil, and Observing the Effect of Moving Water on the Earth's Surface. Each activity includes the instructional objective, procedures to follow, and materials required. Teacher notes are added when necessary. A student evaluation sheet concludes the bulletin. Related documents in the series are SE 015 885 through SE 015 888 and SE 015 890 through SE 015 893. (BL)

ED 079 047 **SE 015 480**
Pugsley, David C.
The Rock Cycle or It's Hard When You're a Rock.
Powell County Environmental Center, Deer Lodge, Mont.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 72
Note—16p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Childrens Books, *Earth Science, *Environmental Education, Geology, *Instructional Materials, Multimedia Instruction, Natural Resources, *Primary Grades
Identifiers—ESEA Title III

Produced for primary grades, this booklet provides study of the mineral or rock cycle in nature. Line drawings, a minimum amount of narrative, and a glossary of terms make up its content. The booklet is designed to be used as reading material, a coloring book, or for dramatic arts with students acting out parts of the cycle. This work was prepared under an ESEA Title III contract. (BL)

ED 086 502 **SE 016 966**
Rogers, Arnold R., Ed.
Project Earth, A Curriculum Guide, Kindergarten-Primary-Intermediate.
Cranston School Dept., R.I.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jan 71
Note—70p.; A conservation Education Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Air Pollution Control, *Curriculum, Ecology, *Elementary School Science, *Environmental Education, Guides, *Instructional Materials, Objectives, Soil Conservation, *Teaching Guides, Water Resources
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This conservation curriculum guide contains units on the air, water, soil, plants, and animals. The guide is organized by grade levels—kindergarten, primary, intermediate. Objectives and concepts are listed and suggested activities are complete with a statement of procedure and necessary materials. A resource appendix includes books, films, and filmstrips. This work was prepared under an ESEA Title III contract. (LS)

ED 097 214 **SE 018 221**
Geology and Our Environment. Environmental Education Curriculum. Revised.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jun 74
Note—68p.; Best copy available; Occasional marginal legibility
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Conservation Education, *Curriculum Guides, *Earth Science, *Environmental Education, *Geology, Instruction, Instructional Materials, Natural Resources, *Secondary School Science, Soil Science
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Rocks, and the soil formed from rock, play a major role in determining such particulars as the type of crops that can be grown in a specific area and the type of housing that can be constructed. Also, rocks may supply fuel and building materials, and provide information about the history of an area. This unit is constructed to expose secondary students to the forces that have determined the topography of an area, data on and field experience in fossil collecting, variance of rocks and fossils in different areas and how this information affects the city dweller's life through such illustrative examples as zoning decisions and considerations in purchasing a home. Teaching aid materials include behavioral objectives of the unit, a suggested time line, suggested methodologies, lists of appropriate films and filmstrips, and suggested evaluative instruments. (MLB)

ED 097 217 **SE 018 224**
Water Pollution. Environmental Education Curriculum. Revised.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jul 73
Note—49p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Conservation Education, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Education, Exceptional Child Education, Instruction, Instructional Materials, Learning Activities, Natural Resources, *Pollution, *Water Pollution Control, Water Resources
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Water is one of the most polluted resources in our environment. Since everyone has the same basic need for pure water, it follows that all people should have a basic knowledge of the causes, results and solutions to the water pollution problem. This unit is designed for use with Level II and III educable mentally retarded students to present information on water pollution on the following four topics: (1) The Importance of Clean Water, (2) Sources of Water Pollution, (3) Effects of Water Pollution, and (4) Solutions to Water Pollution. For each topic there are behavioral objectives, student activities and teacher suggestions. The appendix includes teaching aids that can be removed for duplication. (Author/MLB)

ED 098 067 **SE 018 231**
Abbott, Verlin M.
Everything You've Always Wanted to Know About Weather But Were Afraid to Ask.
Parkway School District, Chesterfield, Mo.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 72
Note—120p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Climatic Factors, *Curriculum Guides, *Elementary School Science, Environment, *Environmental Education, *Environmental Influences, Instructional Materials, Learning Activities, Natural Resources, Primary Education, Teaching Guides, Units of Study (Subject Fields)
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Weather

This unit, designed for primary grades of the elementary schools, focuses on weather and is divided into the following five major parts: Weather Affects Man and His Environment; Air, Wind, and Weather; Clouds and Humidity; Precipitation; and Micro-Environments. Each part includes a list of the concepts to be taught, the behavioral objectives and the expected student criteria for evaluation, pretests and posttests, background information relating to the various topics, and suggested instructional sequences and student data sheets. Most of the activities are outdoor oriented and are designed to take advantage of the various weather conditions possible throughout the year. A bibliography lists additional resource materials including books relating to weather, films and filmstrips, available kits and a directory of distributors. (MLB)

ED 103 236 **SE 018 517**
Contour Mapping, An Environmental Investigation.
Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.
Pub Date 72
Note—24p.; Related documents are SE 018 514-534
Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79212, $1.50)
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—Elementary Grades, *Environmental Education Instructional Materials, Intermediate Grades, Junior High Schools, *Learning Activities, *Mathematics Education, *Science Education, Secondary Grades, Teaching Guides
Identifiers—*Mapping

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires little teacher preparation. The philosophy of this series is based on an experience-oriented process that encourages self-paced independent student work. This particular unit is designed to involve students in contour mapping activities that demonstrate certain principles of geometry. Preliminary activities include directions for building contour mapping equipment. The remaining activities are concerned with the use of this equipment in constructing a contour map. At the end of the unit are six pages ofgraphic information that can be duplicated and distributed to the students. Teacher information includes materials needed, directions for assembling equipment, background information, and additional [illegible] This unit is designed for students, grades [illegible] (MA)

ED 103 248 **SE 018 529**
Shadows, An Environmental Investigation.
Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.
Pub Date 71
Note—17p.; Related documents are SE 018 514-

534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79034, $1.00)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Education, Elementary Grades, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, *Light, Natural Resources, *Science Education, Teaching Guides

Identifiers—*Shadows

This environmental unit is one of a series designed for integration within an existing curriculum. The units are self-contained and require minimal teacher preparation. The philosophy behind the units is based on an experience-oriented process that encourages self-paced independent work. This unit on shadows is designed for all elementary levels, grades 1-8. The activities become progressively more sophisticated, making some more suitable at different levels. In the first section, the goal is for students to explore the concept of spatial relationships through play activities with shadows. The games include shadow tag and keep away, shadow plays, and mystery shadows. The activities of the second section are concerned with shadows caused by sun and earth movements, and with the effects of shade on the life of plants and animals. Activities include studying the passage of time as indicated by shadows, determining the height of a pole by shadow calculations, and investigating the effects of shade on green plants. Each activity in the unit includes a list of materials needed, directions, and questions for discussion. (MA)

ED 103 249 SE 018 530

Snow and Ice, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 71

Note—25p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79052, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Education, Elementary Grades, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, Outdoor Education, *Science Education, Teaching Guides

Identifiers—Ice, Snow, *Weather

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy behind the series is based on an experience-oriented process that encourages self-paced independent student work. In this unit, students study the physical properties of snow and ice in relation to water, heat, the environment, and themselves. It is a goal of this unit that, by learning more about the behavior of water and its environmental influences, the students will become involved enough to recognize water as a vital source of life and want to protect it. Activities, designed for the elementary grades, are generally done outside. Students observe snowflakes, make cross-sections of snow banks, study snow density and make snow paintings. Besides these, there are numerous other snow activities that guide students to the goal of this unit. Each includes a list of materials, background information, and directions for the teacher. (MA)

ED 103 250 SE 018 531

Soil, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—21p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79132, $1.50)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Grades, Elementary Secondary Education, *Environmental Education, Instructional Materials, Investigations, *Learning Activities, Natural Resources, Outdoor Education, *Science Education, Secondary Grades, *Teaching Guides

Identifiers—*Soil

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the series is based on an experience-oriented process that encourages self-paced independent student work. This particular unit investigates soil in relation to acidity, moisture, minerals, and organisms. Students in grades 2-9 can discover how these factors are interrelated and what effects they have on the soil through the activities included in the unit. Techniques for determining soil pH with litmus paper and the presence of soil nitrates with test kits are included. Also, students make a sample of organisms in the soil with the help of a Berlese funnel. Each activity includes a list of the materials needed and where they can be found, background information, directions, and questions for discussion. (MA)

ED 103 251 SE 018 532

Stream Profiles, An Environmental Investigation.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.

Pub Date 72

Note—16p.; Related documents are SE 018 514-534

Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79203, $1.00)

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—*Ecology, Elementary Grades, *Environmental Education, *Field Studies, Instructional Materials, Intermediate Grades, Investigations, Junior High Schools, *Learning Activities, Natural Resources, Outdoor Education, *Science Education, Secondary Grades, Teaching Guides

Identifiers—*Streams

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the units is based on an experience-oriented process that encourages self-paced independent student work. In this unit, students construct a stream profile based on information collected at a portion of a local stream. Teams of three, working ten feet apart, are responsible for recording data on temperature, elevation, type of stream bottom, and plants and animals in the section. The data are then combined with the rest of the class and the profile drawn. Students are prompted to note patterns described by the stream profile and to relate that information to other similar streams. For teachers, the unit includes directions for building the equipment needed, ways of organizing a field trip to the stream area, methods of collecting and recording data, and questions for discussion. The activities can be used with students in grades 4-9. (MA)

ED 111 661 SE 019 604

Abernathy, Sandra

Earth Science Unit for Second Grade: A Seed Crystal Approach.

Pub Date Aug 75

Note—65p.

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—Curriculum, *Earth Science, Elementary Education, *Elementary School Science, Grade 2, *Instructional Materials, *Science Activities, Science Education, Science Units, *Teaching Guides

This teacher's guide to a second-grade earth science unit provides a range of activities, suggestions for classroom discussion, and open-ended questions suitable for each of the concepts developed. One of the central purposes of the unit is to develop independence and self confidence by encouraging the student to think through a problem clearly. The questions and activities give the student practice examining facts at hand and drawing logical conclusions in a nonthreatening atmosphere. For this reason, there are no tests at the end of each section. This is a seed crystal approach; its purpose is to begin building an accurate picture of the planet. Awareness, not mastery of concepts and terms, is the major objective. The first section of the unit, "Physical Nature of the Planet Earth," is conceptually oriented; the student learns facts about the planet and uses that information to solve a problem. The second section, "Physical Nature of Rocks, Minerals, and Fossils," is more concerned with application; the student learns a skill which is used to solve a problem. Also included is a section about careers in geology and paleontology. (Author/MLH)

ED 128 083 PS 008 761

Downey, Mary Anne And Others

Spring: Unit Manual Nine. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; Office of Economic Opportunity, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—78p.; For other manuals in this series, see PS 008 758-63

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$4.67 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Environmental Education, *Instructional Materials, Learning Activities, Natural Sciences, Perceptual Motor Learning, Resource Guides, Science Units, Skill Development, Teaching Techniques, Thought Processes

Identifiers—*DARCEE, Spring

This is number nine in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in the preceding ones. The ninth unit, "Spring," is primarily a science unit. The major content objective is to develop the child's understanding of spring and the changes that occur in plants, animals, weather, and people in the spring. The suggested time for the unit is two weeks. Instructional activities are presented side by side with basic skills to be developed, and space is provided for teachers to outline additional activities and skills. The appendix includes patterns for teacher-made materials. (MS)

ED 133 146 SE 021 461

Ross, Catherine

Round and Round It Goes: A Study of Ecological Cycles. [Project ECOLogy ELE Pak, Ross Pak].

Highline Public Schools, Seattle, Wash.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date [76]

Note—52p.; For related documents, see SE 021 438-478

Available from—Highline Public Schools, Instructional Division, Project ECOLogy ESEA Title III, Bill Guise, Director, 15675 Ambaum Blvd., S.W., Seattle, WA 98166 ($2.50)

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—*Ecology, *Elementary Education, *Elementary School Science, *Environment, Environmental Education, *Instructional Materials, Units of Study (Subject Fields)

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit, designed for third- and fourth-grade students, emphasizes cycles and focuses on the water, oxygen, and nutrient cycles. The eleven lessons in this unit are designed to take one-half to one hour each. Use of the extra activities would increase the time for most lessons. Each lesson includes the concept of the lesson, materials needed, notes to the teacher, procedure, evaluative activities, and suggested additional activities. The materials were tried and evaluated, evaluation data may be obtained from the Highline Public Schools. (RH)

ED 137 063 SE 021 301
Marine Activity Dynamics (M.A.D.). Unit 5.
Rhode Island State Dept. of Education, Providence. Education Information Center.
Pub Date [76]
Note—29p.; Not available in hard copy due to marginal legibility of original document
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS
Descriptors—*Biological Sciences, *Curriculum Development, *Curriculum Guides, *Elementary Grades, Environmental Education, Grade 5, Instructional Materials, *Learning Activities, *Oceanology, Science Education
Identifiers—*Rhode Island

This curriculum guide describes an activity-oriented marine study program, designed for use with middle school children (grade 5). The content focuses primarily upon the life sciences, with some emphasis on chemistry and geology. Following the development of a rationale for the inclusion of marine sciences in the school curriculum, a middle school/marine science educational philosophy is presented. The basis for the selection of marine science education topics is detailed. Lesson topics include: marine biology, fish adaptations, studies in unusual fish, commercial and soft-bone fish, marine geophysics, reptiles and mammals of the sea, waterfowl, conchology, algae, cephalapods, and crustaceans. Objectives are specified and concepts identified for each topic. Several individualized student learning packets are described. Sections on water pollution and chemical ocean studies conclude this guide. (BT)

ED 138 462 SE 022 417
Callughan, Sara S.
Teacher's Activity Guide to Coastal Awareness. Marine Bulletin No. 23.
Rhode Island Coastal Resources Management Council, Providence.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Report No—MB-23
Pub Date 77
Grant—FRC-IGA-01-07
Note—90p.; For related Student Activity Book, see SE 022 416, Page 57 removed due to copyright restrictions, Contains occasional light and broken type
Available from—Rhode Island Coastal Resources Management Council, 83 Park St., Providence, Rhode Island 02903 (no price quoted)
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—*Elementary Education, *Elementary School Science, Marine Biology, *Natural Resources, *Oceanology, Science Education, *Teaching Guides, Water Resources
Identifiers—*Rhode Island

This teacher's guide was prepared for use with "Down Where the Water Is: A Coastal Awareness Activity Book," as part of the Rhode Island Coastal Resources Management Council's public education program. Contained are instructions on the use of the Activity Book, page-by-page, with glossaries, activity ideas, resources, places to visit, and notes identified where relevant. Activity ideas are multi-disciplinary in nature, with four general subject areas specified: (1) language arts; (2) science and mathematics; (3) social studies; and (4) art and music. Pictures in the Activity Book are designed to promote discussion in the elementary school classroom of people, places, and things relating to the coastal environment. (CS)

ED 141 083 SE 022 543
Sea World Curriculum Guide. Program Theme: Adaptations K-3.
Sea World, Inc., San Diego, Calif.
Pub Date 73
Note—34p.; For related documents, see SE 022 544-546; Not available in hard copy due to copyright restrictions, Contains occasional light and broken type
Available from—Education Department, Sea World, 1720 South Shores Road, San Diego, CA 92109 (no price quoted)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—Animal Behavior, *Biological Sciences, Biology, *Curriculum Guides, Ecology, Elementary School Science, Elementary Secondary Education, *Instructional Materials, *Marine Biology, *Oceanology, Science Education, Secondary School Science, Units of Study, Zoology
Identifiers—*Sea World Inc

This document provides science curriculum instructional material relating to marine biology. Items presented relate to live animal exhibits seen during visits to Sea World marine aquarium exhibits; however, all materials are also useful for in-class instruction without visits to Sea World displays. Ideally, material should be reviewed immediately prior to a Sea World exhibit. This unit has a theme of adaptation and includes transparencies and information sheets on tide pools, sea otters, marine mammal adaptation, adaptations of fish and aquatic invertebrates, and social adaptations of sea life. (SL)

ED 141 084 SE 022 544
Sea World Curriculum Guide. Program Theme: Adaptations 4-8.
Sea World, Inc., San Diego, Calif.
Pub Date 73
Note—38p.; For related documents, see SE 022 543-546; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type
Available from—Education Department, Sea World, 1720 South Shores Road, San Diego, CA 92109 (no price quoted)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—Animal Behavior, *Biological Sciences, Biology, *Curriculum Guides, Ecology, Elementary School Science, Elementary Secondary Education, *Instructional Materials, *Marine Biology, *Oceanology, Science Education, Secondary School Science, Units of Study, Zoology
Identifiers—*Sea World Inc

This document provides science curriculum instructional material relating to marine biology. Items presented relate to live animal exhibits seen during visits to Sea World marine aquarium exhibits, however, all materials are also useful for in-class instruction without visits to Sea World displays. Ideally, material should be reviewed immediately prior to a Sea World exhibit. This unit has a theme of adaptation and includes transparencies and information sheets on sharks and adaptation for survival. (SL)

ED 141 085 SE 022 545
Sea World Curriculum Guide. Program Theme: Behavior K-3.
Sea World, Inc., San Diego, Calif.
Pub Date 73
Note—39p.; For related documents, see SE 022 543-546; Not available in hard copy due to copyright restrictions, Contains occasional light and broken type
Available from—Education Department, Sea World, 1720 South Shores Road, San Diego, CA 92109 (no price quoted)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Animal Behavior, *Biological Sciences, Biology, *Curriculum Guides, Elementary School Science, Elementary Secondary Education, *Instructional Materials, *Marine Biology, *Oceanology, Science Education, Secondary School Science, Units of Study, Zoology
Identifiers—*Sea World Inc

This document provides science curriculum instructional material relating to marine biology. Items presented relate to live animal exhibits seen during visits to Sea World marine aquarium exhibits, however, all materials are also useful for in-class instruction without visits to Sea World displays. Ideally, material should be reviewed immediately prior to a Sea World exhibit. This unit has a theme of behavior and includes transparencies and information sheets on whales and killer whales. (SL)

ED 141 086 SE 022 546
Sea World Curriculum Guide. Program Theme: Behavior 4-8.
Sea World, Inc., San Diego, Calif.
Pub Date 73
Note—54p.; For related documents, see SE 022 543-545; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type
Available from—Education Department, Sea World, 1720 South Shores Road, San Diego, CA 92109 (No price quoted)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Animal Behavior, *Biological Sciences, Biology, *Curriculum Guides, Elementary School Science, Elementary Secondary Education, *Instructional Materials, *Marine Biology, *Oceanology, Science Education, Secondary School Science, Units of Study, Zoology
Identifiers—*Sea World Inc

This document provides science curriculum instructional material relating to marine biology. Items presented relate to live animal exhibits seen during visits to Sea World marine aquarium exhibits; however, all materials are also useful for in-class instruction without visits to Sea World displays. Ideally, material should be reviewed immediately prior to a Sea World exhibit. This unit has a theme of behavior and includes transparencies and information sheets on bottlenose dolphins, the walrus, harbor seals, innate behavior, learned behavior, and trained behavior. (SL)

ED 141 142 SE 022 664
Ships and Seaways. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 105. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—47p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Elementary Education, *Instructional Materials, *Language Arts, *Oceanology, *Social Studies, *Teaching Guides, Transportation, Units of Study
Identifiers—Project COAST, Ships

This unit for elementary school students (grade 5) provides materials for about five class periods. Emphasized are language arts and social studies activities related to ships and seaways. Activities include topics on common vessels, shipping routes, navigational guides, and art and writing related to field experiences. A number of transparency masters and a suggested book list are included. (RH)

ED 141 148 SE 022 670
The Moon, the Sun, and Tides. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 214. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—27p.; For related documents, see SE 022 662-687; Contains marginal legibility in Tables
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Earth Science, *Instructional Materials, *Oceanology, *Secondary Grades, *Secondary School Science, *Teaching Guides, Units of Study
Identifiers—Project COAST, *Tides

This unit for students in grades 6-12 is designed to provide an introduction to the variables that cause tides. Included are teacher background materials, a possible three-day schedule, master sheets for transparencies, student activity materials, tests, and references to selected films and books. (RH)

ED 190 401 SE 031 494
Peterson, Linda
Star Lore. Teacher's Guide.
Nebraska State Dept. of Education, Lincoln. Div. of Instructional Services.
Pub Date—78
Note—73p.; Not available in hard copy due to

copyright restrictions.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Childrens Literature, *Curriculum Guides, Elementary Education, *Grade 2, *Language Arts, Literature, Reading, *Story Reading

This literature curriculum for second graders introduces nine story types in 33 lessons, covering more than 40 separate concepts about literature. Designed to be used with telelessons, each of the nine units, corresponding to a specific story type, presents a lesson for each story of that type. Lessons provide lesson objectives and a program summary of the telelesson. At the end of each unit, activities are suggested for listening, talking, reading, writing, drawing, painting, making things, and playing. A bibliography is provided for each unit. Story types include cumulative stories, adventure stories with a journey pattern, stories that explain the unknown, fables, stories with magical solutions, modern fanciful stories, modern realistic stories, biographies, and poetry. (CS)

ED 196 668 SE 033 210

Atkin, J. Myron Wyatt, Stanley P., Jr.
The Universe in Motion, Book 2. Guidebook. The University of Illinois Astronomy Program.
Illinois Univ., Urbana.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—69
Note—97p.; For related documents, see SE 033 211-213.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Astronomy, Elementary Secondary Education, *Physical Sciences, *Science Activities, Science Course Improvement Projects, Science Education, Science History, *Science Programs
Identifiers—*University of Illinois Astronomy Program

Presented is book two in a series of six books in the University of Illinois Astronomy Program which introduces astronomy to upper elementary and junior high school students. This guidebook is concerned with how celestial bodies move in space and how these motions are observed by astronomers. Topics discussed include: a study of the daily motion of the sun, the moon, and the stars; motions of the planets; moving models of the solar system; Kepler's law of planetary motion; and the motion of stars, starpairs, and galaxies. (DS)

ED 196 669 SE 033 211

Atkin, J. Myron Wyatt, Stanley P., Jr.
Gravitation, Book 3. The University of Illinois Astronomy Program.
Illinois Univ., Urbana.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—69
Note—113p.; For related documents, see SE 033 210-213.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Astronomy, Elementary Education, Elementary School Science, Junior High Schools, *Physical Sciences, *Science Activities, Science Curriculum, Science Education, Science History, *Science Programs
Identifiers—*University of Illinois Astronomy Program

Presented is book three in a series of six books in the University of Illinois Astronomy Program which introduces astronomy to upper elementary and junior high school students. The causes of celestial motion are investigated and the laws that apply to all moving things in the universe are examined in detail. Topics discussed include: the basic concepts of speed, acceleration, force and mass; gravity at the earth's surface; Newton's law of universal gravitation; orbital paths near the earth; and the motions and masses of planets and stars. (Author/DS)

ED 196 670 SE 033 212

Atkin, J. Myron Wyatt, Stanley P., Jr.
The Message of Starlight, Book 4. The University of Illinois Astronomy Program.
Illinois Univ., Urbana.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—69
Note—113p.; For related documents, see SE 033 210-213.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Astronomy, Elementary Secondary Education, *Light, *Physical Sciences, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, Science History, *Science Programs
Identifiers—*University of Illinois Astronomy Program

Presented is book four in a series of six books in the University of Illinois Astronomy Program which introduces astronomy to upper elementary and junior high school students. This document terms the analysis of light as an essential clue to understanding astronomical phenomena. Topics discussed include: thm behavior of light; the wave model and the particle model of light; the electromagnetic spectrum; the role of specura in determining stellar temperature, size and chemical composition; the origin of light and the Bohr model of the atom; and the Doppler effect as an aid to understanding the motion of stars and galaxies. (Author/DS)

ED 196 671 SE 033 213

Atkin, J. Myron Wyatt, Stanley P., Jr.
The Life Story of a Star, Book 5. Guidebook. The University of Illinois Astronomy Project.
Illinois Univ., Urbana.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—69
Note—65p.; For related documents, see SE 033 210-212.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Astronomy, Elementary Education, Elementary School Science, Junior High Schools, *Physical Sciences, Science Activities, *Science Curriculum, Science Education, Science History, *Science Programs
Identifiers—*Stars, *University of Illinois Astronomy Program

Presented is book five in a series of six books in the University of Illinois Astronomy Program which introduces astronomy to upper elementary and junior high school students. This guidebook discusses the interior of stars, their source of energy, and their evolution. Topics presented include: the physical properties of the sun; model of the solar interior; using known physical laws as guides; the source of solar energy; properties of stars - their luminosities; temperatures; masses; stellar models; the evolution of stars; and birth and death of stars. (Author/DS)

ED 196 674 SE 033 230

Mellor, Ann And Others
Making Maps. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017719-8
Pub Date—71
Note—25p.; For related documents, see SE 033 231 and SE 033 243. Contains photographs which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Cartography, Elementary Education, *Elementary School Science, *Interdisciplinary Approach, *Maps, *Map Skills, *Science Activities, Science Course Improvement Projects, *Science Curriculum, Science Education

An approach to mapping work in the elementary classroom is presented. Described is a sixth-grade class working with mapping activities for the first time over a three-week span. Activities described include mapping of a classroom, the importance of a key, and important map characteristics. (DS)

ED 196 675 SE 033 231

Barth, Beth And Others
Teacher's Guide for Mapping. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017718-X
Pub Date—71
Note—89p.; For related documents, see SE 033 230 and SE 033 243. Contains photographs which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Cartography, Elementary Education, *Elementary School Science, *Interdisciplinary Approach, *Maps, *Map Skills, *Science Activities, Science Course Improvement Projects, *Science Curriculum, Science Education

Presented is a teacher's guide from the Elementary Science Study offering suggested mapping activities. This guide is organized into four general sections: (1) Finding a Place; (2) Finding Your Way; (3) Looking at Scale; and (4) Outdoor Mapping. Each section suggests activities for several lessons; materials and questions are listed for each activity. (Author/DS)

ED 196 676 SE 033 243

Barth, Beth And Others
Mapping Games. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017720-1
Pub Date—71
Note—42p.; For related documents, see SE 033 230-231. Photographs may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Educational Games, Elementary Education, *Elementary School Science, Interdisciplinary Approach, *Maps, *Map Skills, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, *Science Materials

Presented is a series of activity cards developed in order to help children explore mapping ideas in a variety of ways. Children work with concrete materials such as blocks, puzzles, checkerboards, and three-dimensional graphs. Concepts covered include scale, the usefulness of symbols, and relationships. The games can be used with individuals, small and large groups, and in any sequence. Each activity card includes materials needed and student directions. (Author/DS)

ED 197 984 SE 034 159

Idea Cards for Water Flow. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017734-1
Pub Date—71
Note—32p.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, Physics, *Science Activities, Science Course Improvement Projects, *Science Education, Science Instruction, Water Resources
Identifiers—Elementary Science Study, *Water

Presented are 29 activity cards designed for use with the Elementary Science Study (ESS) program. Each card describes an experiment on one aspect of water flow such as siphoning, methods of removing water from a container, aspirators, floats, and water behavior in various tubing linkups. Activities are intended for individual or small group study; each is illustrated by a photograph or line drawing of the setup. (WB)

Elementary

Energy

ED 089 993 **SE 017 542**

Kennedy, Dave And Others

Create Tomorrow Today. An Energy Awareness Program.

Washington State Board of Education, Olympia.

Pub Date Mar 74

Note—73p.

EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE

Descriptors—Activity Units, Annotated Bibliographies, *Conservation Education, Curriculum, *Elementary School Science, *Energy, *Environmental Education, Guides, *Instructional Materials, Resource Guides

This resource guide is designed for use by teachers. Units are included on the energy crisis, environmental awareness, and decision making concerning shrinking energy resources. Both short-term and long-term problems and alternatives are discussed. Group and individual activities are suggested. Charts and graphs, suitable for making transparencies, are included. A bibliographic section describes books, films, and government publications that are pertinent to the topics. (LS)

ED 093 649 **SE 017 398**

Energy, Environmental Education Curriculum.

Topeka Public Schools, Kans.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Jan 74

Note—158p.

EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE

Descriptors—Activity Learning, *Conservation Education, Curriculum, *Elementary Grades, *Energy, *Environmental Education, Instruction, Instructional Materials, *Unit Plan

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

The material in this unit is intended to provide upper elementary students with basic information about: (1) what energy is, (2) where it comes from, (3) how we use it, and (4) ways we can more wisely use the energy available to us. By the completion of the study of this unit, a student should be well aware that any life style is closely related to the amount of energy available and being consumed. Objectives are listed in front of the unit followed by a cross-reference relating the objectives to the appropriate activities. Maps, charts, graphs, short articles, special activities, and other materials referred to in the various activities are included in the appendix. (JP)

ED 093 673 **SE 017 818**

Jamason, Barry W.

Living Within Our Means: Energy and Scarcity. Environmental Education Instructional Activities K-6.

New York State Education Dept., Albany. Office of Instructional Services.

Pub Date [74]

Note—83p.

EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE

Descriptors—Activity Learning, *Elementary Grades, *Environmental Education, *Instructional Materials, Language Arts, Mathematics, *Objectives, Sciences, Social Studies, *Teaching Guides

This booklet is a source of activities and instructional materials for teaching environmental education concepts in grades K-6. Contents are organized into the areas of language arts, mathematics, science, and social studies and are subdivided by suggested grade level. A listing of basic environmental understandings is referenced with the various activities. (LS)

ED 111 662 **SE 019 617**

Fowler, John W.

Energy-Environment Source Book. Volume 1: Energy, Society, and the Environment. Volume 2: Energy, Its Extraction, Conversion and Use.

National Science Teachers Association, Washington, D.C.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Bureau No—BR-0-047FPA

Pub Date 75

Contract—OEC-0-74-8736

Note—270p.; For related documents, see SE 019 618 and 619

Available from—National Science Teachers Association, 1742 Connecticut Avenue, N. W., Washington, D. C. 20009 (Stock Number 471-14692, $4.00 prepaid)

EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.

Descriptors—Conservation (Environment), Elementary Education, *Elementary School Science, *Energy, Environmental Education, Instructional Aids, *Instructional Materials, *Natural Resources, Science Education, Secondary Education, *Secondary School Science

Identifiers—National Science Teachers Association, NSTA

This source book, one part of a three-part NSTA series on energy-environment, is written for teachers who wish to incorporate material on the complex subject of energy into their teaching. This work is divided into two volumes, each with numerous tables and figures, along with appendices containing a glossary, mathematics primer, heat engine descriptions, and nuclear energy discussion. Volume 1 (Energy, Society, and the Environment) deals with energy and its relationship with conservation, the environment, the economy, and strategies for energy conservation. In Volume 2 (Energy, Its Extraction, Conversion, and Use), topics discussed include the rate of energy consumption, future sources of energy, and the increased cost of energy. (Author/CP)

ED 111 663 **SE 019 618**

Mervine, Kathryn E. Cawley, Rebecca E.

Energy-Environment Materials Guide.

National Science Teachers Association, Washington, D.C.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Bureau No—BR-0-047FPA

Pub Date 75

Contract—OEC-0-74-8736

Note—68p.; For related documents, see SE 019 617 and 619

Available from—National Science Teachers Association, 1742 Connecticut Avenue, N. W., Washington, D. C. 20009 (Stock Number 471-14694, $2.00 prepaid)

EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.

Descriptors—Conservation (Environment), Elementary Education, *Elementary School Science, *Energy, Environmental Education, *Instructional Materials, *Natural Resources, Reading Materials, Resource Guides, Science Education, Secondary Education, *Secondary School Science, Teaching Guides

Identifiers—National Science Teachers Association, NSTA

This publication, one part of a three-part NSTA series on energy-environment, is a sampling of current energy literature. The references are divided into four separate categories, each directed for a specific audience: readings for teachers, readings for students (grades 8-10); Readings for students (grades 5-9); and readings for students (grades K-6). Included in four appendices are guides for films and audio-visual materials, curriculum materials, sources of information, and government documents. (Author/CP)

ED 111 664 **SE 019 619**

Smith, Stephen M., Ed. And Others

Energy-Environment Mini-Unit Guide.

National Science Teachers Association, Washington, D.C.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Bureau No—BR-0-047FPA

Pub Date 75

Contract—OEC-0-74-8736

Note—217p.; For related documents, see SE 019 617 and 618

Available from—National Science Teachers Association, 1742 Connecticut Avenue, N. W., Washington, D. C. 20009 (Stock Number 471-14696, $3.00 prepaid)

EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.

Descriptors—Conservation (Environment), Elementary Education, *Elementary School Science, *Energy, Environmental Education, Instructional Materials, Interdisciplinary Approach, *Natural Resources, Preschool Education, Science Education, Secondary Education, *Secondary School Science, Social Studies, *Teaching Guides

Identifiers—National Science Teachers Association, NSTA

This unit is one part of a three-part National Science Teachers Association (NSTA) series on energy-environment. The goal of this NSTA project is to create a collection of mini-units that provide materials for science and social studies teachers in grades K-12. These materials are intended to make teaching more interdisciplinary and to stimulate decision making in young children. Activities are sought that will enable students to: understand and use existing fundamental concepts in the energy-environment area; identify and evaluate personal and community practices, attitudes, and values related to energy-environment issues; and make effective decisions and/or define their views of appropriate actions on energy-environment issues. (Editor/CP)

ED 127 160 SE 021 180

A Teacher's Introduction to Energy and Energy Conservation: Elementary.

Battelle Memorial Inst., Columbus, Ohio. Center for Improved Education.; Ohio State Dept. of Education, Columbus.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 75

Note—93p.; For related document, see SE021181; Photographs may not reproduce well

Available from—Division of Education Redesign and Renewal, Ohio Dept. of Education, 65 South Front St., Columbus, Ohio 43215 (no price quoted)

EDRS Price MF-$0.83 HC-$4.67 Plus Postage.

Descriptors—Curriculum, Elementary Education, *Elementary School Science, *Energy, *Energy Conservation, General Science, *Instructional Materials, Science Education, *Teaching Guides

Identifiers—*Ohio

This document is intended to give the elementary school teacher background information and general suggestions for teaching units and correlated learning activities related to energy and energy conservation. Sections are directed to: A Problem Shared by All, Causes, What is Energy?, Energy Sources, Searching for Solutions, Conservation: An Ethic for Everyone, a glossary, and an extensive bibliography. (MH)

ED 167 409 SE 026 798

Premo, Joe And Others

Energy Education in Elementary Science: Elementary Science Study.

Minnesota State Energy Agency, St. Paul.

Pub Date Oct 78

Note 68p.; For related document, see SE 026 799

Pub Type Guides - Classroom - Teacher (052)

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors *Curriculum Enrichment, Elementary Education, *Elementary School Science, *Energy, Heat, *Instructional Materials, Light, *Science Activities, Science Course Improvement Project, Science Education

Identifiers *Elementary Science Study, *Energy Education, Minnesota

Elementary Science Study (ESS) units were examined by elementary teachers on a science writing team to identify energy education concepts within the existing curriculum in Minnesota. The outline of energy education concepts is given here along with some energy education science activities for elementary students. The activities are structured into a three-level sequence of lessons: exploration, labeling, and application. While some activities were written by team members, other activities have been adopted from ESS materials. (MR)

ED 167 410 SE 026 799
Lind, Jackie Premo, Joe
Energy Education in Elementary Science: Science Curriculum Improvement Study.
Minnesota State Energy Agency, St. Paul.
Pub Date—Oct 78
Note—93p.; For related document, see SE 026 798
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—Biological Sciences, *Concept Teaching, *Curriculum Enrichment, *Elementary Education, *Energy, Physical Sciences, *Science Course Improvement Project, Science Education, Scientific Concepts
Identifiers—*Energy Education, Minnesota

This looseleaf teacher's manual is designed to facilitate using Science Curriculum Improvement Study (SCIS) for energy education in elementary schools. It is intended to be used with the SCIS Teacher's Guide as a supplement. The format of this manual matches a main SCIS concept with a closely related energy concept. Matrices show matched concepts for each unit. Short elaborative paragraphs are given for each matched concept for the life science and physical science units to serve as teacher preparation. (Author/MR)

ED 173 086 SE 027 871
Gillespie, Judith A.
An Energy Curriculum for the Elementary Grades. Unit I - Energy and You, Unit II - Energy and Your Community, Unit III - Energy in Action.
Indiana State Dept. of Commerce, Indianapolis. Energy Group.; Indiana State Dept. of Public Instruction, Indianapolis. Div. of Curriculum.
Spons Agency—Department of Energy, Washington, D.C.
Pub Date—May 79
Grant—DOE-EW-78-G-45-0042
Note—519p.; For related document, see ED 167 355; Contains occasional light and broken type
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF02/PC21 Plus Postage.
Descriptors—Community Problems, *Elementary Education, *Energy, *Energy Conservation, *Environmental Education, *Life Style, Problem Solving
Identifiers—*Energy Education

The collection of materials is intended to provide for the needs of elementary school teachers who have needs for resources for energy education. The document is divided into three sections. The first section discusses human energy, energy use in home and school, and the relationship of the individual to the energy problem. A second section discusses the role of energy in the community, the consumer's role in energy production, and the existence of energy use patterns. The third section covers the production of energy, some approaches to solving energy problems, and the impact of energy decisions on the social and physical environment of the future. Each lesson includes suggested adaptations for grade level, language arts instruction, and mathematics instruction. (RE)

ED 175 714 SE 028 752
Owens, Jo Ann
Basic Energy Overview.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-35
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—16p.; For related documents, see SE 028 747-757; Contains occasional light and broken type
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Conservation (Environment), *Elementary Education, *Energy, *Energy Conservation, Environmental Education, Interdisciplinary Approach, Natural Resources, *Science Education
Identifiers—*Energy Education, Mississippi

This collection of lessons is designed to be presented in a sequence of five class sessions. It is designed for fifth-grade, above-average achievers. Lessons are intended to help students understand the importance of conserving energy. It stresses the role the student will play in the evolving energy situation. A list of free or inexpensive resources and their sources is provided. (RE)

ED 175 715 SE 028 753
McReynold, Mildred
Energy for the Future.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-36
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—26p.; For related documents, see SE 028 747-757
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Curriculum Planning, *Elementary Education, *Energy, *Energy Conservation, Fuel Consumption, Fuels, Interdisciplinary Approach, *Language Arts, Natural Resources, *Reading Skills
Identifiers—*Energy Education, Mississippi

This collection of lessons is designed to be presented to sixth-grade students in a sequence of 10 class days. Using reading and language skills, the lessons are intended to help students become interested in the energy future and to develop personal values. Special attention is given to conservation and development of alternative energy sources. Also provided are supplementary activities and a list of sources of free or inexpensive materials. (Author/RE)

ED 179 351 SE 028 428
Lendsey, Jacqueline L. And Others
Two Energy Gulfs, Grades 6-7. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy.
National Science Teachers Association, Washington, D.C.
Spons Agency—Bureau of Intergovernmental and Institutional Relations (DOE), Washington, D.C. Office of Education, Business and Labor Affairs.
Report No.—HCP/U3841-03
Pub Date—Mar 79
Contract—EX-76-C-10-3841
Note—94p.
Available from—U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830 (no price quoted)
Pub Type— Collected Works - Serials (022) — Guides - General (050)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Economics, Elementary School Science, *Energy, Environmental Education, Fuel Consumption, *Interdisciplinary Approach, *Intermediate Grades, Maps, Science Curriculum, *Science Instruction, *Social Studies, Worksheets

This text, which focuses on coastal oil production, the countries and the people involved, is designed for use in upper elementary science, social studies, or math courses concerned with energy-related topics. The first half of the text is the Teacher's Guide. It presents an overview of the main ideas for each lesson, strategies for implementation, objectives, materials, and answer keys to student worksheets. The second half is the Student's Guide, including maps, graphs, worksheets, vocabulary, and articles to read. The unit introduces the methods by which oil is extracted from the Persian Gulf region and the Gulf of Mexico region. Transportation by super tankers, energy needs of the people of both regions, and oil production is discussed. A comparative approach to the people of each region stresses the diversity of cultures and is intended to expand children's views of culture. The interdependence of people and energy is emphasized. (SA)

ED 180 803 SE 029 531
Let's Learn About Energy, Module A. Pilot Form.
Florida State Dept. of Education, Tallahassee.; Pasco County Schools, Dade City, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date—76
Note—60p.; For related documents, see SE 029 532-533; Contains light and broken type
Available from—District School Board of Pasco County, Energy Management Center, P. O. Box 190, Port Richey, FL 33568 ($0.65)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Curriculum Development, *Elementary Education, *Energy, Energy Conservation, *Environmental Education, *Grade 4, Instructional Materials, *Learning Modules, Science Education, Teaching Guides
Identifiers—*Energy Education

This booklet is one of a set of learning modules on energy for use by students and teachers in the fourth grade. This module defines energy and examines simple machines. Laboratory activities and a values exercise are included. (BT)

ED 180 804 SE 029 532
Nature's Energy, Module B. Fourth Grade. Pilot Form.
Florida State Dept. of Education, Tallahassee.; Pasco County Schools, Dade City, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date—[76]
Note—69p.; For related documents, see SE 029 531-533
Available from—District School Board of Pasco County, Energy Management Center, P.O. Box 190, Port Richey, FL 33568 ($0.65)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Curriculum Development, Electricity, *Elementary Education, *Energy, Energy Conservation, *Environmental Education, Fuels, *Grade 4, Instructional Materials, *Learning Modules, Science Education, Solar Radiation, Teaching Guides
Identifiers—*Energy Education

This booklet is one of a set of learning modules on energy for use by students and teachers in the fourth grade. This module examines man's use of fossil fuels, electricity production, and other energy sources. Included are laboratory activities and values exercises. (BT)

ED 180 805 SE 029 533
Man and Energy, Module C. Fourth Grade. Pilot Form.
Pasco County Schools, Dade City, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date—76
Note—59p.; For related documents, see SE 029 531-532
Available from—District School Board of Pasco County, Energy Management Center, P.O. Box 190, Port Richey, FL 33568 ($0.65)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Curriculum Development, Ecology, *Elementary Education, *Energy, Energy Conservation, *Environmental Education, Fuels, *Grade 4, Instructional Materials, *Learning Modules, Science Education, Solar Radiation, Teaching Guides
Identifiers—*Energy Education

This booklet is one of a set of learning modules on energy for use by students and teachers in the fourth grade. This module investigates solar energy, ecology, and fossil fuels. Included are laboratory activities and values exercises. (BT)

ED 182 180 SE 029 975
Johnson, Bette Swinton, Olivia
Networks: How Energy Links People, Goods and Services, Grades 4, 5. Interdisciplinary Student-Teacher Materials in Energy, the Environment, and the Economy.
National Science Teachers Association, Washington, D.C.
Spons Agency—Department of Energy, Washington, D.C. Office of Education, Business and Labor Affairs.
Report No.—HCP/U3841-0005
Pub Date—Jun 79
Contract—EX-76-C-10-3841
Note—94p.; For related document, see ED 153 859

Available from—U.S. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, TN 37830 (no price quoted)

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC04 Plus Postage.

Descriptors—Electricity, *Elementary Education, *Energy, Grade 4, Grade 5, *Instructional Materials, Integrated Curriculum, *Science Education, *Social Studies, *Teaching Guides

The purpose of this unit is to investigate a simple energy network and to make an analogy with similar mutually supporting networks in the natural and man-made worlds. The lessons in this unit develop the network idea around a simple electrical distribution system that we depend on and also into further consideration of electrical energy itself. The network idea in the later lessons emphasizes the interdependence of the man-made network for producing and distributing electrical energy and the natural ecological network. In the final lesson, the consuming end of the network is examined and some strategies for consuming electrical energy are examined. Students should learn that energy networks such as the electrical circuits are a necessary part of modern life. They are also expected to learn about sources, conversions, and uses of electrical energy. There are six lessons in this fourth- and fifth-grade unit. Complete teacher and student materials are provided. (BB)

ED 183 392 **SE 030 295**

Mason, Jack L. Cantrell, Joseph S.

Solar Energy: A Middle School Unit. Environmental Education Occasional Paper No. 2.

Ohio State Dept. of Education, Columbus.

Pub Date—Feb 79

Note—28p.; For related documents, see SE 030 294-296; Contains occasional light type

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC02 Plus Postage.

Descriptors—*Class Activities, Electricity, *Energy, Energy Conservation, Environmental Education, Heat, Interdisciplinary Approach, *Middle Schools, Natural Resources, *Science Education, Secondary Education, *Solar Radiation

Identifiers—*Energy Education

This collection of teaching activities was developed to provide teachers with guidance in presenting solar energy education to students of middle school age. The unit provides activities presenting learning opportunities involving: (1) passive solar collectors, (2) active solar collectors, (3) concentrating collectors, and (4) photovoltaic cell collectors. The guide is presented in the sequence: (1) introducing the unit (2 lessons); (2) characteristics of solar energy (3 lessons); (3) capturing solar energy (5-10 lessons); (4) complete solar systems (1-3 lessons); and (5) a summary. (RE)

ED 184 869 **SE 030 527**

Turkel, Tux

The Maine Teacher's Energy Primer.

Maine Audubon Society, Falmouth.

Pub Date—79

Note—41p.; Not available in hard copy due to copyright restrictions.

Available from—Maine Audubon Society, Energy Department, 118 U.S. Route One, Falmouth, ME 04105 ($5.00, $3.50 12 or more).

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Class Activities, *Curriculum Development, Decision Making, Elementary Secondary Education, *Energy, *Energy Conservation, *Environmental Education, Middle Schools, *Science Education, Solar Radiation

Identifiers—*Energy Education

This guide is intended to serve a two-fold purpose: (1) to familiarize the teacher with the jargon, issues, and concepts of energy problems, and (2) to assist the teacher in preparing a curriculum dealing with energy issues. The guide is divided into four chapters: (1) energy basics, (2) uses of energy, (3) conservation, and (4) future scenarios. Each section contains background information and activity descriptions. Each chapter is prefaced with a specification of objectives and a glossary of terms. (RE)

ED 186 231 **SE 030 499**

Allen, Rodney F., Ed.

Exemplary Energy Education Lessons for Elementary School Students, K-6.

Tri-County Teacher Education Center, Sebring, Fla.

Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.; Governor's Energy Office, Tallahassee, Fla.

Pub Date—80

Note—58p.

Pub Type— Guides - Classroom - Teacher (052) — Non-Print Media (100)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Class Activities, Conservation Education, *Elementary Education, *Energy, *Energy Conservation, Environmental Education, *Science Education

Identifiers—*Energy Education

This collection of energy lessons is assembled from teacher-written units. The collection is prefaced by background information on the issues associated with current energy problems. Each lesson contains a statement of objectives and a description of the activity. Additional information on variations and materials is provided where appropriate. (RE)

ED 186 281 **SE 030 760**

How We Make Energy Work: Grades 4, 5, 6 Science.

National Science Teachers Association, Washington, D.C.

Spons Agency—Department of Energy, Washington, D.C. Office of Consumer Affairs.

Report NO.—DOE/CA/06083-02

Pub Date—Apr 80

Contract—EC-77-C-01-6083

Note—80p.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC04 Plus Postage.

Descriptors—Class Activities, Conservation Education, *Curriculum Guides, *Economics, Electricity, *Elementary Education, Elementary School Science, Energy, *Energy Conservation, Environmental Education, Fuel Consumption, *Fuels, Instructional Materials, Natural Resources, Nuclear Physics, Petroleum Industry, *Science Education, Solar Radiation, Utilities

Identifiers—*Energy Education

This packet of units is designed to focus on the technological aspects of energy. Four units are presented, with from 1-4 lessons included in each unit. Units include: (1) basic concepts and applications of energy; (2) steps and processes of energy production and transmission; (3) fuel acquisition; and (4) energy futures and application of non-fossil fuel energy sources. Twenty activity masters are included in this teacher's guide. (RE)

ED 187 554 **SE 030 940**

An Energy Curriculum for the Middle Grades. Unit One: Energy and World Cultures With Adaptations for Science, Language Arts, Practical Arts.

Indiana State Dept. of Commerce, Indianapolis. Energy Group.; Indiana State Dept. of Public Instruction, Indianapolis. Div. of Curriculum.

Spons Agency—Department of Energy, Washington, D.C.

Pub Date—Apr 80

Grant—DE-FG-45-79R510071

Note—229p.; For related document, see SE 030 941. Contains occasional broken type.

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC10 Plus Postage.

Descriptors—Conservation Education, Curriculum Development, Economics, Elementary Secondary Education, *Energy, *Energy Conservation, Environment, Environmental Education, Fuel Consumption, *Fuels, Geography, Instructional Materials, Interdisciplinary Approach, *Language Arts, *Middle Schools, Natural Resources, Petroleum Industry, *Science Education, Social Studies, Technology, World Problems

Identifiers—*Energy Education

This guide is intended to help teachers integrate energy education into middle schools or junior high schools. A teacher's section includes an introduction, bibliography, and glossary. Thereafter, teacher materials sections and student materials sections are paired under topical headings addressing worldwide energy issues. Energy issues are addressed for Africa, Asia, Europe, and the Middle East. Instructions are provided for adapting lessons within the topical headings for integration into science, language arts, and practical arts curricula. (RE)

ED 187 555 **SE 030 941**

An Energy Curriculum for the Middle Grades. Unit Two: Energy and American History With Adaptations for Science, Language Arts, Practical Arts.

Indiana State Dept. of Commerce, Indianapolis. Energy Group.; Indiana State Dept. of Public Instruction, Indianapolis. Div. of Curriculum.

Spons Agency—Department of Energy, Washington, D.C.

Pub Date—Apr 80

Grant—DE-FG-45-79R510071

Note—174p.; For related document, see SE 030 940. Contains occasional light and broken type.

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC07 Plus Postage.

Descriptors—*Class Activities, *Curriculum Guides, Elementary Secondary Education, *Energy, *Energy Conservation, Fuel Consumption, Fuels, *History, Interdisciplinary Approach, Natural Resources, Public Policy, *Science Education, Social Studies, Technology, United States History

Identifiers—*Energy Education

This guide is intended to integrate energy education into the curriculum of the middle school grades. It contains a rationale; a detailed introduction including a teacher's guide, glossary, and bibliography; a teacher's guide to a cartoon book; and separate teacher's entries and student entries for various eras of American history. The subjects discussed in the various sections include: (1) Energy and Colonial America; (2) Energy and Industrialism; and (3) Energy and the Post War Period. (RE)

ED 191 743 **SE 032 874**

Schmidt, Joan S. And Others

Conservation Activities Related to Energy: Energy Activities for Urban Elementary Students, K-6.

Beaver Coll., Glenside, Pa.; Office of Education (DHEW), Washington, D.C. Teacher Corps.; Philadelphia School District, Pa.

Spons Agency—Department of Energy, Washington, D.C. Office of Education, Business and Labor Affairs.

Pub Date—80

Grant—DE-FG05-80IR10958

Note—161p.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC07 Plus Postage.

Descriptors—*Class Activities, *Curriculum Development, Decision Making, Elementary Education, *Energy, *Energy Conservation, Fuel Consumption, Home Economics, Interdisciplinary Approach, Natural Resources, Public Policy, *Science Education, *Urban Education

Identifiers—*Energy Education

Presented are simple activities, experiments, and demonstrations relating to energy conservation in the home. Activities are divided into four areas: (1) kitchen, (2) house, (3) transportation, and (4) heating and cooling. The material has been designed to require a minimum of preparation. Activity and game masters are provided. Activities may be adapted to meet individual skill levels of students. Theory is presented to lead logically to practical applications. (Author RE)

ED 191 745 **SE 032 380**

Bottinelli, Charles A.

The Energy Scorecard: A Way to Trim Your Energy Bills. Teacher's Guide.

Energy Information Associates, Inc., Littleton, Colo.

Spons Agency—Colorado State Office of Energy Conservation, Denver.

Pub Date—Oct 79

Note—267p.; Page HE-2 removed due to copyright restrictions. Some colored pages may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC11 Plus Postage.

Descriptors—*Class Activities, Curriculum Development, *Decision Making, *Energy, *Energy Conservation, *Fuel Consumption, Home Economics, *Interdisciplinary Approach, Mathematics Education, Public Policy, Science Education, Secondary Education, Social Studies

Identifiers—*Energy Education

The goal of this mini-unit is to involve students and their parents in a cooperative exercise to increase awareness of areas of household energy consumption. Low-cost methods for reducing energy waste and reducing energy costs are provided. The document has separate sections containing activities in the disciplines of: (1) home economics, (2) mathematics, (3) science, and (4) social studies. (Author/RE)

ED 193 062 SE 032 964
Brennan, Matthew J.
Energy and My Environment: K-6 Teachers' Guide. Draft.
Governor's Energy Office, Tallahassee, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—Nov 79
Note—142p.; For related document, see SE 032 965. Contains occasional light and broken type.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Energy, Energy Conservation, *Environmental Education, *Resource Materials, Science Education, Social Studies
Identifiers—*Energy Education

One hundred energy education activities comprise this manual for elementary school teachers. Two or three lessons, which deal with each of seven energy-related conceptual schemes, are provided for every grade level. These experience-oriented activities emphasize questions, observations, and class discussion. Lesson plans include directions for introducing and developing the activity, suggestions for extending the learning experience, and a listing of the lesson's concept and objective. (WB)

ED 193 063 SE 032 965
Brennan, Matthew J.
Energy and My Environment: 7-9 Teachers' Guide. Draft.
Governor's Energy Office, Tallahassee, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—Nov 79
Note—160p.; For related document, see SE 032 964. Contains occasional light and broken type.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—*Energy, *Energy Conservation, *Environmental Education, Junior High Schools, Physics, *Resource Materials, Science Education, Science Instruction, Secondary Education, *Secondary School Science, Social Studies

Over 60 energy education activities comprise this manual for junior high school teachers. These lessons are experience-oriented and emphasize questioning, the use of reference materials, data collection, and discussion. For every grade level, three activities dealing with each of seven recurring conceptual schemes are provided. Lesson plans include directions for introducing and developing the activity, suggested extensions of the learning experience, and a listing of the lesson's concept and objective. (WB)

ED 194 347 SE 033 188
Feliu, Tom Lively, Lisa
The Best of Energy Book, Grades 1/3.
Colorado State Univ., Ft. Collins. Cooperative Extension Service.; Denver County Public Schools, Colo.
Pub Date—80
Note—159p.; For related document, see SE 033 189.
Available from—The Cambridge Book Company, 888 7th Ave., New York, NY 10106 (Two volume set order no. ISBN 832343, $14.00; Grades 1/3 order no. ISBN 832327, $7.95).
Pub Type— Guides - Classroom - Teacher (052)
Document Not Available from EDRS.
Descriptors—Art Activities, Elementary School Mathematics, *Elementary School Science, *Energy, *Energy Conservation, Environmental Education, Interdisciplinary Approach, Language Arts, Physics, Primary Education, Resource Materials, Science Education, Science Instruction, Social Studies
Identifiers—*Energy Education

Presented are 48 energy education lessons adapted from available materials and published in a standardized format. Intended for the lower elementary grades, these activities are grouped according to subject area which permits a teacher to present energy topics in connection with the subject with which he/she feels most comfortable. Lesson plans are keyed by energy "message," grade level, and time required; they include objectives, background information for the teacher, materials needed, references, and a step-by-step procedure. Several illustrations accompany each lesson. An additional "short on energy" section offers activities that take 15 minutes or less to complete. Also included are brief descriptions of energy-related children's books, curriculum materials, and films. (WB)

ED 194 348 SE 033 189
Feliu, Tom Lively, Lisa
The Best of Energy Book, Grades 4/6.
Colorado State Univ., Ft. Collins. Cooperative Extension Service.; Denver County Public Schools, Colo.
Pub Date—80
Note—160p.; For related document, see SE 033 188.
Available from—The Cambridge Book Company, 888 7th Ave., New York, NY 10106 (Two volume set order no. ISBN 832343, $14.00; Grades 4/6 order no. ISBN 832335, $7.95).
Pub Type— Guides - Classroom - Teacher (052)
Document Not Available from EDRS.
Descriptors—*Elementary School Science, *Energy, *Energy Conservation, Environmental Education, Interdisciplinary Approach, Intermediate Grades, Language Arts, Mathematics Education, Mathematics Instruction, Physics, Resource Materials, Science Education, Science Instruction, Social Studies
Identifiers—*Energy Education

Intended for upper elementary students, these energy-related lessons have been adapted from existing materials and published in a standardized format. The 54 activities are grouped by subject area, which allows a class to investigate energy in connection with almost any discipline. Lesson plans include objectives, background information for the teacher, materials needed, references, and a step-by-step procedure; they are keyed according to energy "message," grade level, and time required. An additional "short on energy" section presents activities which require 15 minutes or less to complete. Several illustrations accompany each lesson. Also included are short descriptions of children's books, films, and curriculum materials related to energy education. (WB)

ED 194 352 SE 033 196
Krukowski, Pat, Ed. And Others
Energywatch: Designing Energy Education Into the Curriculum, Volume 1 - Grades K-6.
Area Cooperative Educational Services, New Haven, Conn.; Connecticut State Dept. of Education, Hartford.
Pub Date—Nov 80
Grant—NESEC-EG-77-G-01-4044
Note—262p.; For related document, see SE 033 197. Some copyrighted cartoons deleted. Funding received from the Northeast Solar Energy Center.
Available from—Dr. Sigmund Abeles, Connecticut State Dept. of Education, Box 2219, Hartford, CT 06115 (no price quoted).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC11 Plus Postage.
Descriptors—Conservation Education, Elementary Education, *Elementary School Science, *Energy, Energy Conservation, *Environmental Education, *Instructional Materials, Interdisciplinary Approach, Science Education, Science Instruction, Social Studies

Contained in this teacher's manual are over 40 energy education activities for elementary school students. Lessons are designed for science, social studies, mathematics, and language arts classes. This approach is intended to allow teachers to provide students with energy-related learning opportunities throughout the school program as parts of courses that are already being taught. Activities are organized under six major topic headings: (1) Energy - The Concept, (2) Energy Sources, (3) Energy Uses, (4) Energy Conservation, (5) Energy and Economics, and (6) Energy and the Environment. Learning strategies employed range from class discussions and values clarification experiences to model building, performing experiments, and using resource materials. Lesson plans include objectives, skills, background information for the teacher, required preparation, references, student handouts, and step-by-step procedures for carrying out the activities. (WB)

Elementary

Multiple Areas

ED 042 639 **SE 009 765**
[Conservation Units.]
Texas Education Agency, Austin.
Pub Date [70]
Note—45p.
EDRS Price MF-$0.25 HC-$2.35
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, *Instruction, *Instructional Materials, Interdisciplinary Approach, Teaching Guides

Each of the six instructional units deals with one aspect of conservation: forests, water, rangeland, minerals (petroleum), and soil. The area of the elementary school curriculum with which each correlates is indicated. Lists of general and specific objectives are followed by suggested teaching procedures, including ideas for introducing the topic, questions to ask, demonstrations to perform, and evaluation methods. Where appropriate, reference to books, pamphlets, charts, films, and filmstrips for teacher reference or class use are provided. Specific examples given are concerned with Texas situations. (AL)

ED 042 640 **SE 009 766**
[Conservation Units.]
Texas Education Agency, Austin.
Pub Date [70]
Note—118p.
EDRS Price MF-$0.50 HC-$6.00
Descriptors—*Conservation Education, *Environmental Education, *Instruction, *Instructional Materials, Interdisciplinary Approach, *Secondary Education, Teaching Guides

Instructional units deal with each aspect of conservation: forests, wildlife, rangelands, water, minerals, and soil. The area of the secondary school curriculum with which each is correlated is indicated. Lists of general and specific objectives are followed by suggested teaching procedures, including ideas for introducing the topic, questions to ask, demonstrations to perform and evaluation methods. Where appropriate, references to books, pamphlets, charts, films, and filmstrips for teacher reference or class use are provided. Specific examples given are concerned with the Texas environment. (AL)

ED 042 643 **SE 009 784**
Outdoor Activities.
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—69p.
EDRS Price MF-$0.50 HC-$3.55
Descriptors—*Biology, *Elementary School Science, *Environmental Education, *Instruction, *Instructional Materials, Outdoor Education, Science Activities, Teaching Guides
Identifiers—ESEA Title III

Twenty-four activities suitable for outdoor use by elementary school children are outlined. Activities designed to make children aware of their environment include soil painting, burr collecting, insect and pond water collecting, studies of insect galls and field mice, succession studies, and a model of natural selection using dyed toothpicks. A group called "investigations" are simple experimental studies of soil inhabitants, succession of burned areas, railway right-of-way ecology, the effects of modifying plant and animal habitats, and fish behavior. The last group of activities introduces quantitive measurements of soil, and air temperature, soil composition, fish population dynamics, and mapping. Teaching hints are included for each activity. This work was prepared under an ESEA Title III contract. (AL)

ED 064 042 **SE 012 719**
Primary Science Curriculum Guide, A. Beginning Science.
Victoria Education Dept. (Australia).
Pub Date 68
Note—120p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Case Studies, Culturing Techniques, *Curriculum, *Elementary School Science, *Instruction, Interdisciplinary Approach, *Science Activities, *Teaching Guides
Identifiers—Australia

Suggestions for providing science experiences for children in kindergarten and grades one and two are given in this first part of the Victorian Education Department (Australia) guide to the elementary school science curriculum. (See SE 012 720 and SE 012 721 for additional guides to this curriculum.) The suggestions are illustrated by brief case studies of successful teaching episodes, particularly where the activities have provided material for written expression, mathematics, and social studies as well as for science. In all cases the emphasis is on direct student experimentation and observation, with minimal teacher direction. Many possible activities are given for introducing "discrimination and classification," and "interactions and change" are suggested using living and non-living materials as examples in both cases. An appendix contains hints on collecting, maintaining, and using living organisms in the classroom. A second appendix provides ideas for developing children's awareness of time. (AL)

ED 064 043 **SE 012 720**
Primary Science Curriculum Guide, B. Following On.
Victoria Education Dept. (Australia).
Pub Date 69
Note—104p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Biology, *Curriculum, *Elementary School Science, General Science, *Interdisciplinary Approach, Physical Sciences, *Science Activities, *Teaching Guides
Identifiers—Australia

Suggestions for methods of teaching the science material included in grades three and four of the elementary school curriculum of the Education Department of Victoria are illustrated by descriptions of successful teaching episodes, particularly when science activities have served as an introduction to written expression, applied number, and social studies "lessons." The emphasis throughout is on individual student manipulation and experimentation in a flexible, inter-related program. In each of the sections, "Matter," "Energy," and "Life," methods of assisting the development of observation, categorization, measurement, organization, inference, testing ideas, and language skills are suggested. (See also SE 012 719 and SE 012 721.) (AL)

ED 064 044 **SE 012 721**
Primary Science Curriculum Guide, C. Branching Out.
Victoria Education Dept. (Australia).
Pub Date 69
Note—152p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Biology, *Curriculum, *Elementary School Science, General Science, Instruction, *Interdisciplinary Approach, Physical Sciences, *Science Activities, *Teaching Guides
Identifiers—Australia

Examples of reports from children in grades 4-6 of Education Department of Victoria schools are used to illustrate the suggestions made for teaching the topics included in the science course. Emphasis is given to methods of inter-relating science and other activities, including social studies, mathematics, writing and history. Teachers are encouraged to provide children with extensive manipulative and experimental experiences. The topics discussed in the section on "Matter" concern the nature of liquids, diffusion, separation of materials, corrosion, the production of gas, and other examples of chemical and physical changes in household materials. "Energy" includes studies of heating and cooling, electricity and magnetism, light, sound, and movement. In "Life" the topics are primarily concerned with behavior, ecological principles, and growth. (AL)

ED 066 505 **TM 001 989**
Lieberman, Marcus And Others
Primary Science: Behavioral Objectives and Test Items.
Institute for Educational Research, Downers Grove, Ill.
Pub Date [72]
Note—58p.
Available from—Institute for Educational Research, 1400 West Maple Avenue, Downers Grove, Illinois 60515 ($2.00)
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, Curriculum Development, *Individualized Instruction, *Item Banks, *Primary Grades, Program Evaluation, *Sciences
Identifiers—ESEA Title III, *Evaluation for Individualized Instruction Project

The Objective-Item Bank presented covers 16 sections of four subject areas in each of four grade levels. The four areas are: Language Arts, Math, Social Studies, and Science. The four grade levels are: Primary, Intermediate, Junior High, and High School. The Objective-Item Bank provides school administrators with an initial starting point for curriculum development and with the instrumentation for program evaluation, and offers a mechanism to assist teachers in stating more specifically the goals of their instructional program. In addition, it provides the means to determine the extent to which the objectives are accomplished. This document presents the Objective Item Bank for primary science. (CK)

ED 066 506 **TM 001 990**
Lieberman, Marcus And Others
Intermediate Science: Behavioral Objectives and Test Items.
Institute for Educational Research, Downers Grove, Ill.
Pub Date [72]
Note—152p.
Available from—Institute for Educational Research, 1400 West Maple Avenue, Downers Grove, Illinois 60515 ($6.00)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Behavioral Objectives, Curriculum Development, *Elementary Grades, *Individualized Instruction, *Item Banks, Program Evaluation, *Sciences
Identifiers—ESEA Title III, *Evaluation for Individualized Instruction Project

The Objective-Item Bank presented covers 16 sections of four subject areas in each of four grade levels. The four areas are: Language Arts, Math, Social Studies, and Science. The four grade levels are: Primary, Intermediate, Junior High, and High School. The Objective-Item Bank provides school administrators with an initial starting point for curriculum development and with the instrumentation for program evaluation, and offers a mechanism to assist teachers in stating more specifically the goals of their instructional program. In addition, it provides the means to determine the extent to which the objectives are accomplished. This document presents the Objective Item Bank for intermediate science. (CK)

ED 068 465 **SP 007 347**
Elementary Science Curriculum and Resource Guide 1969.
Mounds View Public Schools, St. Paul, Minn.
Pub Date 69
Note—389p.
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Curriculum Guides, *Elementary School Curriculum, *Elementary School Science, *Science Curriculum, *Science Education
Identifiers—Elementary Science Study, E.S.S.

GRADES OR AGES: Grades K-6. SUBJECT MATTER: Science. ORGANIZATION AND PHYSICAL APPEARANCE: This guide has been organized according to grade level. Introductory materials indicate the basic approach and the major objectives for science education. Each unit is divided into two columns: skills and concepts and activities and resources. Materials for each grade are organized under three broad topics: universe and earth, living things, and matter and energy. Elementary Science Study (E.S.S.) units have been incorporated into this guide at appropriate grade levels. The guide is lithographed and spiral-bound with a hard cover. OBJECTIVES AND ACTIVITIES: The objectives for each unit are listed under skills and concepts. Detailed activities are suggested. INSTRUCTIONAL MATERIALS: Films and books are listed under activities and resources. STUDENT ASSESSMENT: No provisions are made for evaluation. (MJM)

ED 070 588 SE 014 413
200 Outdoor Science Activities, A Classroom Extension.
Ontario Teachers' Federation, Toronto.
Pub Date 69
Note—30p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Ecology, *Elementary Grades, Environmental Education, Field Studies, Field Trips, *Natural Resources, *Outdoor Education, *Science Activities, *Teaching Guides

To encourage teachers to use the out-of-doors in their teaching, this booklet has been prepared by the Ontario Teachers' Federation. It reviews basic approaches to out-of-doors instruction, types of field trips, teacher training and sources of instructional assistance, pre-planning and follow-up for a field trip, and points to consider in evaluation. Following this are 200 outdoor science activities, each of which allows direct exposure to material things out-of-doors so pupils may gain an appreciation of their environment and an understanding of ecological relationships. Animals, birds, geology, insects, meteorology, physical science, plant life, snow, temperature, and trees are the topics of study. Each activity is briefly described and coded for unique environment or activity area (stream, marsh, open field, school year, woodlot, all areas). Concluding information lists resource books for both teachers and students in many areas of natural resources. (BL)

ED 071 772 PS 006 323
Warner, Jeanette V., Comp.
Year-Round Sensory Activities.
Pennsylvania State Dept. of Education, Harrisburg. Bureau of General and Academic Education.
Pub Date 72
Note—13p.; Contributed by participants at the Shippensburg Summer Conference, June 1972
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Conference Reports, *Curriculum Guides, Elementary School Science, *Kindergarten, Natural Sciences, *Primary Grades, *Science Activities, Science Education, Science Materials, *Sensory Experience, Sensory Training

This month-by-month calendar of suggested sensory activities is intended to be part of the science curriculum in kindergarten and the primary grades. It takes advantage of the child's natural interest in examining the world around him. Lists of natural and man-made objects appropriate to each school month are divided according to the sense to which they appeal most. (KM)

ED 097 210 SE 018 216
Environmental Activities. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date May 74
Note—106p.; Best copy available; Occasional marginal legibility
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Animal Behavior, Biological Sciences, *Curriculum Guides, *Early Childhood Education, *Elementary School Science, *Environmental Education, Instruction, Instructional Materials, Learning Activities, Natural Resources, *Outdoor Education, Primary Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This unit attempts to respond to societal concerns for the rapid depletion of our world's natural resources, our increasing world population, current pollution problems and the lack of knowledge about natural interdependence. The material is intended as a source from which primary teachers can select activities from five generalized groups as follows: animals; plants; weather; miscellaneous environmental activities such as a rock study, how to use a thermometer, making microscopic slides and discovering dirt; and developing observation skills and using all five senses. Each activity is intended as a separate entity with a general format of stating the activity's objectives, listing materials needed, providing background information and describing the activity. (MLB)

ED 100 652 88 SE 018 343
Kindergarten, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—87p.
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Conservation Education, Early Childhood Education, *Environmental Education, Instructional Materials, Interdisciplinary Approach, *Kindergarten, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, *Project I C E, Title III

This kindergarten level environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of 12 episodes (minilesson plans), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The kindergarten guide focuses on aspects such as weather, temperature, population, water pollution, transportation, the seasons, litter, and a conservation of resources. Each of the 12 concepts is covered in one of the 12 episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 100 653 88 SE 018 344
Grade One, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—111p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, Grade 1, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This first grade environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design, it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of 12 episodes (minilessons), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The first grade guide focuses on aspects such as planets and seasons, living and nonliving organisms, overpopulation, water uses, and animal adaptation. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitige and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 100 654 88 SE 018 345
Grade Two, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—[illegible]
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, Grade 2, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This second grade environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of episodes (minilesson plans), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The second grade guide focuses on aspects such as graphs, personal responsibility, simple machine, fuels, and land use. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. An appendix containing related game is included. (Author/TK)

ED 100 655 88 SE 018 346
Grade Three, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Public Instruction, Madison.
Pub Date [74]
Note—121p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, Grade 3, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This third grade environmental education guide is one of a series of guides, K-12, that were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of episodes (mini-lessons), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The third grade guide focuses on aspects such as food/clothing/shelter, family and roles, water quality, desert regions, and sound. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. An appendix containing related games is included. (Author/TK)

ED 100 656 88 SE 018 347
Grade Four, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—115p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Conservation Education, *Elementary Education, *Environmental Education, Grade 4, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title, ESEA Title III, *Project I C E

This fourth grade environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of episodes (minilessons), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The fourth grade guide focuses on aspects such as soil and organisms, water purification, poetry, and design. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. An appendix containing related games is included. (Author/TK)

ED 100 657 88 SE 018 348
Grade Five, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—146p.
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, Grade 5, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This fifth grade environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best integrated into the existing classroom curriculum. This guide contains a series of episodes (minilessons), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels. The fifth grade guide focuses on aspects such as sun, energy, ecosystems, industrial growth, speech, and urban aesthetics. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. An appendix containing related games is included. (Author/TK)

ED 100 658 88 SE 018 349
Grade Six, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—106p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Conservation Education, *Elementary Education, *Environmental Education, Grade 6, Instructional Materials, Interdisciplinary Approach, Learning Activities, *Natural Resources, Outdoor Education, Science Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This sixth grade environmental education guide is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design; it is the teacher's decision when the concepts, objectives, activities, and resources may best be integrated into the existing classroom curriculum. This guide contains a series of episodes (minilessons), each having a number of suggested in- and out-of-class learning activities. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or in different subject areas. This guide focuses on aspects such as energy, air-graphing, natural resources, and a political convention turned environmental. Each of the 12 concepts is covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. An appendix containing related games is included. (Author/TK)

ED 103 235 SE 018 516
Color and Change, An Environmental Investigation.
Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.
Pub Date 72
Note—17p.; Related documents are SE 018 514-534
Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79221, $1.00)
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—Art Education, Color, Elementary Education, Elementary Grades, *Environmental Education, Instructional Materials, *Learning Activities, *Observation, *Process Education, *Science Education, Teaching Guides
Identifiers—MINNEMAST Minnesota Mathematics and Science Teaching Project, SAPA, Science A Process Approach

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires very little teacher preparation. The philosophy of the series is based on an experience-oriented process that encourages students to work independently and at their own speeds. This particular unit is designed to develop the skill of observation in young children. The activities have been drawn from Science - A Process Approach and the MINNEMAST Elementary Science and Mathematics project. Students are asked to make observations of color and color changes in natural objects, particularly plants. Some works is done with extracted plant pigments. Teacher information concerning materials, background information, and additional topics is given. A short bibliography is included. (MA)

ED 103 252 SE 018 533
Tile Patterns and Graphs, An Environmental Investigation.
Minnesota Environmental Sciences Foundation, Inc., Minneapolis.; National Wildlife Federation, Washington, D. C.
Pub Date 72
Note—17p.; Related documents are SE 018 514-534
Available from—National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036 (Order No. 79141, $1.00)
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—Elementary Grades, *Environmental Education, Graphs, Instructional Materials, Investigations, *Learning Activities, *Mathematics Education, Natural Resources, Primary Education, *Sampling, *Science Education, Teaching Guides

This environmental unit is one of a series designed for integration within an existing curriculum. The unit is self-contained and requires minimal teacher preparation. The philosophy of the series is based on an experience-oriented process that encourages self-paced independent student work. This unit is an introduction to sampling for young primary school students. Using different colored tiles, students learn to create patterns that will eventually be specific enought to form graphs. In this way, the children will be able to make a graphic representation of their random samples. Also included in the activities are elementary discussions on the validity of using samples to represent the whole. A list of materials needed, directions, and graph paper for duplication are a part of the unit. (MA)

ED 104 689 SE 018 940
Whitla, Dean K. Pinck, Dan C.
Lively Elementary Science Programs. A Handbook of Suggestions for Introducing and Maintaining Innovative Science Activities.
Harvard Univ., Cambridge, Mass. Faculty of Arts and Sciences.
Spons Agency—Massachusetts Advisory Council on Education, Boston.
Pub Date Jan 74
Note—66p.; Related documents are ED 091 159 and 160
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—*Curriculum, Curriculum Development, Curriculum Research, *Educational Research, Elementary Education, *Elementary School Science, Guides, *Instructional Improvement, *Science Education, Teacher Education

This handbook contains several suggestions for introducing and maintaining innovative science activities. It supplements the published research findings of the Harvard Study Committee ("Essentially Elementary Science") as well as the summary of those findings ("Something of Value") by offering teachers, administrators, school committee directors, teacher training leaders, and State Department of Education personnel a description of important management alternatives that can be selected and pursued to bring the benefits of NSF programs to elementary students. Topics presented include research programs developed related to teacher education, implementation of science curricula related to use of skilled teachers to train others, teacher-directed centers for the advancement of teaching and learning, the need for information relating to attitudes and resources, and the need for trials or pilot programs for new curricula. (Author/EB)

ED 123 055 **SE 020 403**
Reilly, Dennis
Correlated Enrichment Environmental Activities for the S.A.P.A. Curriculum Kits A through D.
Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date May 73
Grant—NSF-GW-6703
Note—139p.; Occasional Marginal Legibility
Available from—Mr. John R. Reiher, State Supervisor of Science and Environmental Education, Dept. of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 (Free while supply lasts)
EDRS Price MF-$0.83 HC-$7.35 Plus Postage
Descriptors—*Elementary School Science, Enrichment Activities, *Environmental Education, *Instructional Materials, Learning Activities, Outdoor Education, *Primary Grades, *Science Activities
Identifiers—Del Mod System, SAPA, Science A Process Approach

These environmental enrichment activities were written by teachers and consultants in workshops and institutes. The activities are appropriate for K-3. For each level the sequence of original activities including the new environmental activities is listed. General objectives for the level are given. The enrichment activities list materials, objectives, trip procedures and questions, and audiovisual materials. The activities were developed for field work as part of outdoor education. (MR)

ED 127 164 **SE 021 201**
Adams, Patricia A., Ed.
Overview: MINNEMAST.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date Aug 70
Note—58p.; For related documents, see SE021202-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Curriculum, Elementary Education, *Elementary School Mathematics, *Elementary School Science, *Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This illustrated booklet provides a rationale and overview for the twenty-nine coordinated mathematics and science units in the MINNEMAST program for kindergarten through third grade. The rationale for the program cites both the historical association of mathematics and science and pedagogical advantages. The goals of the project are to provide both mathematical and scientific knowledge, and to emphasize the development of tools for learning by emphasizing methods of acquiring knowledge rather than memorization of facts. Eight clusters of threads are woven through the curriculum; three of these are related to processes (observation, generalization, and linking of observations with generalizations), and five to subjects (real numbers, geometry, formal concepts of science, scientific topics, and the links between science and mathematics). This volume presents a chart showing the relationship of these threads to individual units, a statement of skill development goals for each grade level, and brief descriptions of the individual units. (SD)

ED 127 165 **SE 021 202**
Humphreys, Alan [illegible]st, Thomas R.
MINNEMAST Recommendations for Science and Math in the Intermediate Grades.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 70
Note—55p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Curriculum, Curriculum Planning, Elementary Education, *Elementary School Mathematics, *Elementary School Science, *Instructional Materials, *Interdisciplinary Approach, Intermediate Grades, Mathematical Applications, Mathematics Education, Process Education, Science Education, Textbooks
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume provides recommendations for teaching mathematics and science to intermediate students who have been taught using the MINNEMAST materials during the primary grades. After reviewing briefly the goals and content of the primary curriculum, the authors discuss the transitions from the integrated program to distinct curricula in mathematics and science. For each field, several criteria for the intermediate curriculum are defined and alternate models are offered. Text and supplementary materials are suggested for each of these models. Brief descriptions of the recommended texts are provided. (SD)

ED 127 169 **SE 021 206**
Page, Laura M. Reed, Elizabeth W.
Watching and Wondering: MINNEMAST Coordinated Mathematics - Science Series, Unit 1.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—136p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Environment, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, *Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the first in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of six groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The emphasis in this unit is on observing objects and phenomena with which the child is somewhat familiar. The six activity groups are entitled: (1) Exploring the classroom, (2) Exploring the school building, (3) Exploring outdoor areas, (4) I wonder, (5) Weather, and (6) Day and night. Reading lists for both students and teacher are provided as is a set of masters for a take-home booklet. (SD)

ED 127 170 **SE 021 207**
Muckey, Roy And Others
Curves and Shapes: MINNEMAST Coordinated Mathematics - Science Series, Unit 2.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—128p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Geometric Concepts, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the second in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The four activity groups in this unit are concerned with curves, regions, and boundaries. A variety of activities aimed at developing the notions of open and closed, simple and non-simple curves are described. Other activities are related to describing edges of objects as curves and to regions. (SD)

ED 127 171 **SE 021 208**
Dyrud, Grace H. Page, Laura M.
Describing and Classifying: MINNEMAST Coordinated Mathematics - Science Series, Unit 3.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—126p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Pattern Recognition, Primary Grades, Process Education, Science Education, Set Theory, *Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the third in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit deals with sets of objects, with problems of classification and description of objects, and with comparisons of sets. Activities described use property blocks and other objects in game, puzzle and story situations to develop conservation, and the basic notions of set theory. (SD)

ED 127 172 **SE 021 209**
Page, Laura M. Reed, Elizabeth W.
Using Our Senses: MINNEMAST Coordinated Mathematics - Science Series, Unit 4.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—123p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$6.01 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Lesson Plans, Mathematics Education, Observation, *Perception, Primary

Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the fourth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of seven groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit deals with the five senses. After an introductory pair of lessons on exploring sense impressions, groups of lessons for sight, hearing, smell, taste, and touch are discussed. A final section of lessons is titled "Fun With Our Senses." Bibliographies for both students and teacher are included in this volume. (SD)

ED 127 173 SE 021 210
Edmunds, Polly T. Schrankler, William J.
Introducing Measurement: MINNEMAST Coordinated Mathematics - Science Series, Unit 5.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—116p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$6.01 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Measurement, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the fifth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit presents activities related to measurement. Individual sections of the unit concern: (1) length, (2) area, (3) volume, and (4) time. In each section, the activities are concerned with comparison of objects (or durations), and development of ideas related to ordering. A brief list of children's books related to measurement is included. (SD)

ED 127 174 SE 021 211
Dyrud, Grace H. Paer, Laura M.
Numeration: MINNEMAST Coordinated Mathematics - Science Series, Unit 6.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—113p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$6.01 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Number Concepts, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the sixth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of five groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The five sets of lessons in this volume review the idea of correspondence between sets, and introduce counting and numeration by tallying and with numeral symbols. An optional section concerns the values of coins. (SD)

ED 127 175 · SE 021 212
Blair, Kay W. Forseth, Sonia D.
Introducing Symmetry: MINNEMAST Coordinated Mathematics - Science Series, Unit 7.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—83p.; For related documents, see SE021201-234; Photographs may not reproduce well; Transparencies in this document removed due to poor reproducibility
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, *Symmetry, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the seventh in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by kindergarten teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The sections of this unit concern: (1) rotational symmetry, (2) repeating patterns, (3) bilateral symmetry; and (4) symmetry in sound and movement. A bibliography of books related to symmetry is provided for the teacher. (SD)

ED 127 176 SE 021 213
Dyrud, Grace H. And Others
Observing Properties: MINNEMAST Coordinated Mathematics - Science Series, Unit 8.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—159p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—Classification, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Observation, Pattern Recognition, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the eighth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit, concerned with the observation of properties of objects, and the use of these observations in classification and description, includes sections titled: (1) observing and describing properties, (2) sorting sets by properties, (3) testing for properties, and (4) changing and unchanging properties. (SD)

ED 127 177 SE 021 214
Blair, Kay W. Thomson, Polly V.
Numbers and Counting: MINNEMAST Coordinated Mathematics - Science Series, Unit 9.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—123p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$6.01 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Number Concepts, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the ninth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The lessons in this volume are organized into four sections: (1) one-to-one correspondence, (2) tallying, counting, and reading numerals from 0 to 20, (3) writing numerals and counting practice, and (4) ordering and the order-signs. A variety of topics related to these threads is included; among these are estimation of large numbers and names for numbers in other languages. (SD)

ED 127 178 SE 021 215
Kraby, James Rieff, Marilyn
Describing Locations: MINNEMAST Coordinated Mathematics - Science Series, Unit 10.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—100p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Geometric Concepts, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the tenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of two groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This volume introduces the basic geometric notion of linearity, and provides activities related to the use of properties of lines in determining positions of objects. Lessons are organized into two sections: (1) lines, direction and location, and (2) locations and maps. A master for a "take-home fun activity" related to location of places on a map is also included. (SD)

ED 127 179 **SE 021 216**

Blair, Kay W. Edmunds, Polly T.

Introducing Addition and Subtraction: MINNEMAST Coordinated Mathematics - Science Series, Unit 11.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—141p.; For related documents, see SE021201-234

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$7.35 Plus Postage.

Descriptors—Addition, Basic Skills, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Number Systems, Primary Grades, Process Education, Science Education, Subtraction, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the eleventh in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of five groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this unit, the operations of addition and subtraction of whole numbers are introduced and developed. Section I introduces the "a+b" notation and related addition to the joining of sets. In section two, subtraction is developed using missing addend problems. Later sections concern (3) grouping, even and odd numbers, and arrays; (4) introduction to the number line; and (5) numerals through 99. Three supplementary games are also included. (SD)

ED 127 180 **SE 021 217**

Kraby, James Rieff, Marilyn

Measurement with Reference Units: MINNEMAST Coordinated Mathematics - Science Series, Unit 12.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—206p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$11.37 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Measurement, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twelfth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and disucssion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit is concerned with measurement of length, area, volume, and time durations. After reviewing the comparison of objects in a previous unit, the idea of standard units is introduced; a variety of tools (e.g., paper clip chains, popsicle sticks, rulers) is used in measurement activities. The pendulum and a variety of clocks are used in activities related to time. (SD)

ED 127 181 **SE 021 218**

Blair, Kay W. Edmunds, Polly T.

Interpretations of Addition and Subtraction: MINNEMAST Coordinated Mathematics - Science Series, Unit 13.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—133p.; For related documents, see SE021201-234

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$7.35 Plus Postage.

Descriptors—Basic Skills, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Number Systems, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the thirteenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by first-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of six groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This volume begins with a review of addition by joining sets and then introduces addition and subtraction on the number line. The use of the addition slide rule is introduced and problems for practice in addition and subtraction are provided. Properties of addition and subtraction are explored, and place value notation is introduced. (SD)

ED 127 183 **SE 021 220**

David, Edith, Ed.

Investigating Systems: MINNEMAST Coordinated Mathematics - Science Series, Unit 15.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—125p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$6.01 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, *Systems Approach, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the fifteenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of six groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this volume, six types of scientific systems are explored: (1) simple systems (rolling balls, magnets), (2) a color system, (3) seed dispersal systems, (4) chemical systems, (5) eating systems, and (6) a bulb-lighting system. (SD)

ED 127 184 **SE 021 221**

Vogt, Elaine E., Ed.

Numbers and Measuring, Learning With TOR: MINNEMAST Coordinated Mathematics Science Series, Unit 16.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—159p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, Interdisciplinary Approach, Learning Activities, Mathematics Education, *Measurement, Number Concepts, *Number Systems, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the sixteenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of five groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit begins with a review of ordering concepts and then introduces linear measurement to the nearest half inch, measuring and adding fractional units, and measuring diameters and circumferences. Fourteen lessons are devoted to systems of numeration and place value. The measurement of weight, an introduction to negative numbers, and our monetary system are the subjects of other lesson sequences. (SD)

ED 127 185 **SE 021 222**

Ihrig, Elizabeth A., Ed.

Introducing Multiplication and Division, Kangaroos and Numbers: MINNEMAST Coordinated Mathematics - Science Series, Unit 17.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—70p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—*Curriculum Guides, Division, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Multiplication, *Number Systems, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields), Whole Numbers

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the seventeenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of five groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this unit, multiplication is approached as repeated addition on a number line. In a second set of lessons, multiplication is considered in conjunction with arrays. Addition and multiplication are then compared, and simple fractions are introduced. A final review section is also included. (SD)

ED 127 186 SE 021 223
Davis, Edith R., Ed.
Scaling and Representation: MINNEMAST Coordinated Mathematics - Science Series, Unit 18.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—94p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Engineering Drawing, Experimental Curriculum, Geometric Concepts, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, *Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the eighteenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of 12 lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit concerns the representation of objects, the use and construction of scale drawings and three-dimensional models, and the use of instruments. (SD)

ED 127 187 SE 021 224
Vogt, Elaine E., Ed.
Comparing Changes: MINNEMAST Coordinated Mathematics - Science Series, Unit 19.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—172p.; For related documents, see SE021201-234
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, Graphs, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, *Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the nineteenth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of five groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The focus of this unit is on experimental activities related to the prediction and observation of change. One section is related to the growth of plants, a second to duration of time and clock reading, and a third to other functional relationships. The construction of graphs by plotting ordered pairs is introduced. The final section of the unit concerns the measurement of volume and weight. Also included is a bibliography listing related books and films. (SD)

ED 127 188 SE 021 225
Ihrig, Elizabeth A., Ed.
Using Larger Numbers: MINNEMAST Coordinated Mathematics - Science Series, Unit 20.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—129p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Number Concepts, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twentieth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of three groups of lessons and activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit begins with three computational games, and then provides a sequence of thirteen lessons aimed at building skill at addition and subtraction with large numbers. The final set of lessons is related to building a weather station. (SD)

ED 127 189 SE 021 226
Biersteker, Joseph And Others
Angles and Space: MINNEMAST Coordinated Mathematics - Science Series, Unit 21.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—169p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Geometric Concepts, Geometry, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-first in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of three groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The first section of this unit is concerned with angles and their measurement. The unit of measurement used is called a Mag and angles are measured with a special circular protractor. The other sections deal with polygons and polyhedra. (SD)

ED 127 190 SE 021 227
Sohre, Beverly, Ed.
Parts and Pieces: MINNEMAST Coordinated Mathematics - Science Series, Unit 22.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 70
Note—138p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, Fractions, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Measurement, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-second in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by second-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of seven groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The distinction between counting measure and measure of amount is introduced in the first lesson. Subsequent lessons deal with the use of fractions in the measurement of weight, length, Mag of angles, time and area. In the final section, rules for calculation with fractions are developed. (SD)

ED 127 191 SE 021 228
Vogt, Elaine E., Ed.
Conditions Affecting Life: MINNEMAST Coordinated Mathematics - Science Series, Unit 23.
Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—204p.; For related documents, see SE021201-234; Photographs may not reproduce well
Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414
EDRS Price MF-$0.83 HC-$11.37 Plus Postage.
Descriptors—*Biology, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)
Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-third in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of six groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. The preparatory lessons in this volume revolve around a field trip designed to introduce students to the importance of moisture, temperature, and light for living things. Each of these conditions is explored further in a subsequent set of lessons. After a review of the material learned, the final set of lessons concern seasonal changes. (SD)

ED 127 192 SE 021 229

Adams, Patricia A., Ed. Nyberg, Luanne, Ed.

Change and Calculations: MINNEMAST Coordinated Mathematics - Science Series, Unit 24.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—158p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Algorithms, Computers, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Measurement, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-fourth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons and activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit covers both computational and measurement ideas. In the two sets of lessons on computation, the class simulates a computer in activities designed to promote understanding of addition and subtraction in a place value system. Measurement activities are related to liquid volume, length and time. Two job booklets, one on pouring and the other on balancing as methods of measurement, provide activities for independent work by students. (SD)

ED 127 193 SE 021 230

Bray, Edmund C. Rudin, Paul

Multiplication and Motion: MINNEMAST Coordinated Mathematics - Science Series, Unit 25.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—163p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, Graphs, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Multiplication, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-fifth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of three groups of activities. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this unit, data collected in foot racing and car racing activities are graphed on grids and properties of the graphs are examined. The idea of slope is used to motivate an introduction to multiplication. Multiplication as repeated addition is reviewed, as is the relationship between arrays and multiplication. A "multiplication machine" and cards for use in a multiplication game are provided. (SD)

ED 127 194 SE 021 231

Sohre, Beverly, Ed.

What Are Things Made Of? MINNEMAST Coordinated Mathematics - Science Series, Unit 26.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—247p.; For related documents, see SE021201-234; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$12.71 Plus Postage.

Descriptors—Chemistry, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Physical Sciences, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-sixth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of eight groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this unit, chemical and physical properties of materials are examined. Properties studied are hardness, weight, volume, density, color separation, shape, solubility, and chemical reaction. (SD)

ED 127 195 SE 021 232

Adams, Patricia, Ed.

Numbers And Their Properties: MINNEMAST Coordinated Mathematics - Science Series, Unit 27.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—155p.; For related documents, see SE021201-234; Photographs may not reproduce well; Contains small print in Worksheets

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, *Multiplication, Number Systems, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-seventh in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit reviews concepts related to multiplication which were introduced in earlier units, then expands these concepts to include multiplication by zero, the use of placeholders in multiplicative problems, multiplication of more than two factors, and the use of the vertical algorithm. Work with partitioning of arrays, using Cartesian products, and solving word problems is included. (SD)

ED 127 196 SE 021 233

Ihrig, Elizabeth A., Ed.

Mapping the Globe, Transformations: MINNEMAST Coordinated Mathematics - Science Series, Unit 28.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 71

Note—167p.; For related documents, see SE021201-234; Photographs may not reproduce well; Transparencies at the end of the document were removed due to poor reproducibility

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Maps, Mathematics Education, Primary Grades, Process Education, Science Education, Topology, *Transformations (Mathematics), Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the twenty-eighth in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of four groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. This unit begins by distinguishing between measurable and nonmeasurable properties of 2- and 3-dimensional objects. Topological transformations are then introduced using shadows, rubber sheets, and clay. Projective transformations are examined and used in the making of maps. (SD)

ED 127 197 SE 021 234

Bakke, Jeannette And Others

Natural Systems: MINNEMAST Coordinated Mathematics - Science Series, Unit 29.

Minnesota Univ., Minneapolis. Minnesota School Mathematics and Science Center.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 72

Note—134p.; For related documents, see SE021201-233; Photographs may not reproduce well

Available from—MINNEMAST, Minnemath Center, 720 Washington Ave., S.E., Minneapolis, MN 55414

EDRS Price MF-$0.83 HC-$7.35 Plus Postage.

Descriptors—*Curriculum Guides, Elementary Education, *Elementary School Mathematics, *Elementary School Science, *Environmental Influences, Experimental Curriculum, *Interdisciplinary Approach, Learning Activities, Mathematics Education, Primary Grades, Process Education, Science Education, Units of Study (Subject Fields)

Identifiers—*MINNEMAST, *Minnesota Mathematics and Science Teaching Project

This volume is the last in a series of 29 coordinated MINNEMAST units in mathematics and science for kindergarten and the primary grades. Intended for use by third-grade teachers, this unit guide provides a summary and overview of the unit, a list of materials needed, and descriptions of three groups of lessons. The purposes and procedures for each activity are discussed. Examples of questions and discussion topics are given, and in several cases ditto masters, stories for reading aloud, and other instructional materials are included in the book. In this unit, three types of systems are examined. In the section on locomotion, the movement patterns of people, four-legged animals, fish, and birds are compared and contrasted. The functions of different parts of plants in carrying water is studied as an integrated system. The final section concerns the process of erosion, and examines factors related to this process. (SD)

ED 128 080 **PS 008 758**

Camp, Janet And Others

Home and Family: Unit Manual Four. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Coordination Center for Early Childhood Education, St. Ann, Mo.; National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; National Inst. of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—176p.; For other manuals in this series, see PS 008 759-63

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$10.03 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Family Life, *Instructional Materials, Learning Activities, Perceptual Motor Learning, Resource Guides, Skill Development, Social Studies Units, Teaching Techniques, Thought Processes

Identifiers—*DARCEE

This is number four in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in preceding ones. The fourth unit, "Home and Family," is primarily a social studies unit focusing on characteristics of families, pets, homes, and objects found in homes. The suggested time for the unit is three weeks. Instructional activities are presented side by side with basic skills to be developed. A list of instructional materials and their sources is given. The appendix includes action-songs, poems, and patterns for teacher-made materials. (MS)

ED 128 081 **PS 008 759**

Camp, Janet Wilkerson, Peggy

Winter: Unit Manual Five. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Coordination Center for Early Childhood Education, St. Ann, Mo.; National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; National Inst. of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—135p.; For other manuals in this series, see PS 008 758-763

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$7.35 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Environmental Education, *Instructional Materials, Learning Activities, Natural Sciences, Perceptual Motor Learning, Resource Guides, Science Units, Skill Development, Teaching Techniques, Thought Processes

Identifiers—*DARCEE, Holidays, Winter

This is number five in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in preceding ones. The fifth unit, "Winter," is primarily a science unit. The major content objectives are to expand the child's understanding of people and plants and to increase awareness of environmental changes. The suggested time for the unit is three weeks. Instructional activities are presented side by side with basic skills to be developed. A list of instructional materials and their sources is given. Appendix includes patterns for teacher-made materials. (MS)

ED 128 082 **PS 008 760**

Lewis, Ann And Others

Farm Animals: Unit Manual Eight. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; Office of Economic Opportunity, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—106p.; For other manuals in this series, see PS 008 758-63

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$6.01 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Instructional Materials, Learning Activities, *Livestock, Perceptual Motor Learning, Resource Guides, Skill Development, Social Studies Units, Teaching Techniques, Thought Processes

Identifiers—*DARCEE

This is number eight in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in preceding ones. The eighth unit, "Farm Animals," is primarily a social studies unit covering animals frequently found on farms. The major content objective is to develop the child's understanding of farm animals, how they live, and how they are used by people. The suggested time for the unit is three weeks. Instructional activities are presented side by side with basic skills to be developed, and space is provided for teachers to outline additional activities and skills. A list of instructional materials and their sources is given. The appendix includes patterns for teacher-made materials. (MS)

ED 128 083 **PS 008 761**

Downey, Mary Anne And Others

Spring: Unit Manual Nine. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; Office of Economic Opportunity, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—78p.; For other manuals in this series, see PS 008 758-63

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$4.67 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Environmental Education, *Instructional Materials, Learning Activities, Natural Sciences, Perceptual Motor Learning, Resource Guides, Science Units, Skill Development, Teaching Techniques, Thought Processes

Identifiers—*DARCEE, Spring

This is number nine in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in the preceding ones. The ninth unit, "Spring," is primarily a science unit. The major content objective is to develop the child's understanding of spring and the changes that occur in plants, animals, weather, and people in the spring. The suggested time for the unit is two weeks. Instructional activities are presented side by side with basic skills to be developed, and space is provided for teachers to outline additional activities and skills. The appendix includes patterns for teacher-made materials. (MS)

ED 128 084 **PS 008 762**

Camp, Janet And Others

Transportation: Unit Manual Ten. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.

Spons Agency—National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; Office of Economic Opportunity, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date 72

Contract—NPECE-70-006

Grant—OEO-CG-9995

Note—83p.; For other manuals in this series, see PS 008 758-63

Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)

EDRS Price MF-$0.83 HC-$[illegible]67 Plus Postage.

Descriptors—*Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, *Instructional Materials, Learning Activities, Perceptual Motor Learning, Resource Guides, Skill Development, Social Studies Units, Teaching Techniques, Thought Processes, *Transportation

Identifiers—*DARCEE

This is number 10 in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in the preceding ones. The tenth unit, "Transportation," is primarily a social studies unit. The major content objectives are to develop the child's awareness and understanding of the various ways of transporting people and goods and the particular characteristics and uses of different vehicles. The suggested time for the unit is two to three weeks. Instructional activities are presented side by side with basic skills to be developed, and space is provided for teachers to outline additional activities and skills. The appendix includes patterns for teacher-made materials. (MS)

ED 128 085 **PS 008 763**

Lewis, Ann And Others

Farm Crops: Unit Manual Eleven. Curriculum Guide.

George Peabody Coll. for Teachers, Nashville, Tenn. Demonstration and Research Center for Early Education.
pons Agency—National Institutes of Health (DHEW), Bethesda, Md. Bureau of Health Professions Education and Manpower Training.; Office of Economic Opportunity, Washington, D.C.
Pub Date 72
Contract—NPECE-70-006
Grant—OEO-CG-9995
Note—83p.; For other Manuals in this series, see PS 008 758-63
Available from—CEMREL, 3120 59th Street, St. Louis, Missouri 63139 (Paper, $2.50)
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—*Agriculture, *Basic Skills, *Cognitive Development, Concept Teaching, *Curriculum Guides, *Early Childhood Education, Food, *Instructional Materials, Learning Activities, Marketing, Perceptual Motor Learning, Resource Guides, Skill Development, Social Studies Units, Teaching Techniques, Thought Processes
Identifiers—*DARCEE

This is number 11 in a series of resource manuals consisting of 11 sequenced curriculum guides developed by the Demonstration and Research Center for Early Education (DARCEE) for use in early childhood education programs. Emphasis is placed on the development of sensory, abstracting and mediating, and response skills. The projected order of the units is: (1) All About Me, (2) Plants, (3) Autumn, (4) Home and Family, (5) Winter, (6) Forest Animals, (7) Neighborhood and Community, (8) Farm Animals, (9) Spring, (10) Transportation, (11) Farm Crops. Each unit is intended to build upon skills developed in the preceding ones. The eleventh unit, "Farm Crops," is primarily a social studies unit covering crops and foods from field to market. The major content objective is to develop children's understanding of where the food they eats comes from and the steps involved n growing and marketing it. The suggested time or the unit is two to three weeks. Instructional activities are presented side by side with basic skills to be developed, and space is provided for teachers to outline additional activities and skills. A list of instructional materials and their sources is given. The appendix includes patterns for teacher-made materials. (MS)

ED 167 424 **SE 026 854**
Science for Children, 4-6.
New York State Education Dept., Albany. Bureau of General Education Curriculum Development.; State Univ. of New York, Albany.
Pub Date—78
Note—165p.; Contains occasional small, light and broken type
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—Course Organization, Curriculum Development, *Elementary Education, *Elementary School Science, *Instructional Materials, Science Activities, *Science Education, Science Units, Teaching Guides, Teaching Techniques
Identifiers—New York

This publication developed by the New York State Education Department with the cooperation of the University of the State of New York, is a curriculum guide for elementary science (grade 4-6). This guide is organized around 6 large subject areas: (1) Living things; (2) Our growing bodies; (3) Air, water and weather; (4) The earth and its composition; (5) The solar system; and (6) Matter and energy. It is also organized by grade level in each of the six major areas of study. Each such unit follows a sequential teaching pattern incorporating suggested activities for the teacher as well as for the pupil. The format is consistent through all grade levels and is organized as follows: (1) apparatus and materials; (2) purpose of the unit; (3) introduction of the unit; (4) experiences relating to the unit; (5) enrichment; (6) organization and use of information gained; (7) basic understandings; (8) vocabulary; and (9) scientists. A table that summarizes the organization of this elementary science program with suggested grade placement is also included. (Author/HM)

ED 174 472 **SE 028 544**
Crowder, Betty Pogue And Others
Oakland County Science Safety Series: Reference Guide for Elementary Science.
Oakland County Schools, Pontiac, Mich.
Pub Date—77
Note—102p.; For related documents, see SE 028 545-547; Not available in hard copy due to copyright restrictions; Contains colored pages that may not reproduce well; Pages 63-64a removed due to copyright restrictions ; Guide prepared by the Division of Instruction
Available from—Oakland Schools, Division of Instruction, 2100 Pontiac Lake Road, Pontiac, Michigan 48054 ($8.50 complete set; $2.50 ea.)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Accident Prevention, *Class Activities, *Elementary Education, *Elementary School Science, Field Trips, Laboratory Procedures, Laboratory Safety, Safety, *School Safety, *Science Education, Science Instruction

This reference guide is designed to organize and suggest acceptable practices and procedures for dealing with safety in elementary science instruction. It is intended as a reference for teachers, administrators, and other school staff in planning for science activities and in making daily safety decisions. Topics covered in the guide include: (1) responsibility; (2) animals; (3) chemicals; (4) electricity; (5) field trips; (6) first aid; (7) high risk labs; (8) lab equipment; (9) open flames; (10) plants; (11) model rockets, etc.; and (12) safety glasses. Several appendices deal with specialized considerations. (Author/RE)

ED 180 772 **SE 029 400**
Elementary Science Resource Guide.
Texas Education Agency, Austin. Div. of Curriculum Development.
Pub Date—79
Note—71p.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Educational Resources, Elementary Education, *Elementary School Science, Instructional Aids, *Process Education, *Science Activities, Science Instruction, *Teaching Guides, Teaching Methods

This guide for elementary teachers provides information on getting ideas into action, designing and implementing the right situation, ways in which to evaluate science process activities with students, and seven sample units. The units cover using the senses, magnets, forces, weather forecasting, classification of living things, and the physical characteristics of water. An appendix provides a variety of books, film sources, supply houses, and other references of value in enriching the science program. (SA)

ED 183 374 **SE 029 960**
McCormack, Alan J., Comp.
Outdoor Areas as Learning Laboratories. CESI Sourcebook. An Occasional Sourcebook of The Council for Elementary Science, International.
ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—Dec 79
Contract—400-78-0004
Note—219p.
Available from—Information Reference Center (ERIC/IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, OH 43212 ($6.50)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC09 Plus Postage.
Descriptors—Class Activities, *Earth Science, Ecology, Elementary Secondary Education, *Environment, *Environmental Education, Interdisciplinary Approach, Natural Resources, *Outdoor Education, Pollution, *Science Education, Solar Radiation, Water Resources

This guide is intended to be a source of ideas for outdoor learning activities appropriate for youngsters in elementary, middle, and junior high schools. It may also be useful for those who work with children primarily in outdoor settings. Decisions as to which activities are appropriate for particular age levels are left to the teacher. Each activity includes title, focus, challenges, materials and equipment, instructions, further challenges, and references appropriate to the activity. Activities are designed to assist the teacher in using outdoor areas surrounding the school as a laboratory for effective instruction. (Author/RE)

Elementary

Physical Sciences

ED 021 746 **SE 004 828**
Trieger, Seymour
INVESTIGATING SCIENCE WITH CHILDREN, VOLUME 3, ATOMS AND MOLECULES.
National Aeronautics and Space Administration, Washington, D.C.; National Science Teachers Association, Washington, D.C.
Pub Date 64
Note—95p.
Available from—Teachers Publishing Corporation, 23 Leroy Avenue, Darien, Connecticut 06820.
EDRS Price MF-$0.50 HC Not Available from EDRS.
Descriptors—*ELEMENTARY SCHOOL SCIENCE, *INSTRUCTIONAL MATERIALS, LABORATORY EXPERIMENTS, MATTER, *PHYSICAL SCIENCES, SCIENCE ACTIVITIES, *TEACHING GUIDES
Identifiers—National Aeronautics and Space Administration, National Education Association, National Science Teachers Association

This is the third in a series of guidebooks written for elementary school teachers to assist them in improving their science instruction. The book attempts to emphasize processes and creativity as well as content. Atoms and molecules constitute the subject matter of the publication. Many experiments and demonstrations are included. (BC) .

ED 084 016 **PS 006 835**
Keislar, Evan R. Luckenbill, Maryann
A Learning Center on the Lever for Young Children.
California Univ., Los Angeles. Early Childhood Research Center.
Spons Agency—Office of Economic Opportunity, Washington, D.C.
Pub Date 73
Note—13p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Activity Learning, Curriculum, *Educational Games, Elementary Science, *Kindergarten, *Learning Laboratories, *Mechanics (Physics), *Open Education, Preschool Children, Social Relations

This document describes a project designed to explore the possibilities of children's learning in mechanics. The principle of the lever, one example of a simple machine, was used in the form of a balance toy. The apparatus was set up as a game in a specially devised learning center. The children made non-verbal predictions as to which way the bar would tilt when various weights were placed at either end. After completion of a pilot study, 22 kindergarten children were chosen as subjects. Half of the groups received orientation to provide a clear replicable procedure for introducing the materials. A criterion test was developed. The apparatus was then placed in the classroom with no restrictions as to who could use it or for how long. Observers noted the children's behavior, recording anecdotal information and use of the balance. On the fourth day, all children were posttested. Results indicated that both groups (with or without orientation) performed similarly on the posttest. Discussion centered on the use of learning centers in open classrooms for facilitating learning, and the possibilities of teaching scientific principles to young children. (DP)

ED 093 692 **SE 018 015**
Cleland, Winston E.
Newtonian Mechanics for Elementary School Teachers.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 73
Note—65p.; After September 1, 1974 no copyright shall subsist or be claimed in this work and it shall constitute material in the public domain
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($1.50, make checks payable to the Del Mod System)
EDRS Price MF-$0.75 HC-$3.15 P[illegible] POSTAGE
Descriptors—Behavioral Objectives, *Elementary School Science, Instruction, *Instructional Materials, *Physics, Science Education, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This monograph presents a module that introduces Newtonian Mechanics and related Science - A Process Approach (SAPA) materials. The activities are designed to give the necessary background for understanding the physics involved with the SAPA exercises relevant to this topic. The module is designed so that it can be used with individualized format. It is not designed to be used on a completely independent basis. Three of the topics presented, Using Space/Time Relationships, Predicting, and Measuring, are taken directly from Science - A Process Approach/Part E. Other topics include Distance Measure, Volume Measure, Direction (Vectors), Force, and Momentum. Each laboratory experience is presented in such a way to include objectives, procedures, materials needed and discussion and/or review questions. (EB)

ED 094 958 **SE 016 785**
Pella, Milton O. And Others
Classroom Materials for Teaching "The Particle Nature of Matter." Practical Paper No. 173.
Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
Spons Agency—National Center for Educational Research and Development (DHEW/OE), Washington, D.C. Regional Research Program.
Report No—WRDCCL-PP-173
Bureau No—BR-5-0216
Pub Date Jul 71
Contract—OEC-5-10-154
Note—194p.; See Technical Report 173 (ED 070 658) for related document
EDRS Price MF-$0.75 HC-$9.00 PLUS POSTAGE
Descriptors—*Atomic Structure, Audiovisual Aids, *Educational Research, *Elementary School Science, *Instructional Materials, Learning Activities, Lesson Plans, Science Education, Teaching Guides
Identifiers—*Research Reports

This document presents the lesson plans and tests used in the research study reported in Technical Report 173 (ED 070 658), together with descriptions of models and films developed for the teaching program. Thirty-one lessons are included, covering the topics of matter and energy, making interferences; particles; a model for matter; particles and spaces; particle size; motion of particles; expansion and contraction; solid, liquid, and gas structures; boiling and condensation; melting and freezing; pressure; elements, compounds, and mixtures; atoms and subatomic particles; electric charges and forces; isotopes; and molecules. Each lesson provides the teacher with background information on the topic covered and on suggested teaching procedures, lists the materials needed for the lesson, and outlines the procedures to be followed. Material for a series of 54 transparencies and test questions for evaluating student achievement are included. (DT)

ED 193 074 **SE 032 991**
Thompson, Lowell
Photography in the Elementary Classroom.
North Dakota Univ., Grand Forks. Center for Teaching and Learning.
Pub Date—Oct 80
Note—16p.
Available from—Insights, Center for Teaching and Learning, Box 8158, University of North Dakota, Grand Forks, ND 58201 (annual subscription $3.-50).
Journal Cit—Insights: Into Open Education; v13 n2 Oct 1980
Pub Type— Collected Works - Serials (022) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—*Class Activities, *Curriculum Design, *Curriculum Development, Elementary Education, *Elementary School Curriculum, *Instructional Materials, Interdisciplinary Approach, Photographic Equipment, *Photography, Science Education

Described are some ideas for using photography in the elementary classroom. Justification for using photography in the classroom includes student interaction with the photography materials, building teacher-student rapport, the potential for integration into different areas of elementary curriculum, and support for the developmental theorists' viewpoints that learning takes place through direct experience with materials. Topics covered include: (1) Why use photography in the classroom; (2) Some projects that have been tried; (3) Other project ideas; (4) How to use a 35mm camera; (5) How to develop negatives; (6) How to print black and white pictures; (7) How to process your own color slides; and (8) Some books teachers and students might find helpful when working on a photography unit. (Author/DS)

ED 196 656 **SE 033 093**
Seager, Doug And Others
Teacher s Guide for Heating and Cooling. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017709-0
Pub Date—71
Note—65p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Heat, Instructional Materials, Junior High School Students, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, Secondary Education, Secondary School Science, Temperature

This teacher's guide suggests activities that provide opportunities for children in grades 5 through 8 to explore, by direct experiment, the ways in which various materials behave when they are heated and cooled. Included within this guide are explanations for a set of Problem Cards which suggest experiments for students to try individually. (CS)

ED 196 657 **SE 033 094**
Lange, Robert V. And Others
Teacher's Guide for Optics. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017694-9
Pub Date—71
Note—67p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Light, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education

This teacher's guide suggests activities that provide opportunities for upper elementary students to explore, by direct experiment, many of the properties of light. Equipment is listed and construction of a light source is detailed. Instructions are given for setting up a classroom with electrical equipment. Activities are described in units dealing with mirrors, colored light, and refraction. (CS)

ED 196 658 **SE 033 095**
Hein, George E. And Others
Teacher's Guide for Spinning Tables. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation,

Washington, D.C.
Report No.—ISBN-07-017699-X
Pub Date—71
Note—25p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Elementary Education, *Elementary School Science, *Physical Sciences, *Science Activities, Science Course Improvement Projects, *Science Curriculum, Science Education

This teacher's guide suggests a number of ways to use a spinning table to explore circular motion. Activities are described which are appropriate for children in kindergarten through third grade. Suggestions are made for exploratory activities using the equipment rather than supplying detailed instructions for formal activities. Equipment and accessories are listed. Suggested activities include ones using chalk, marbles and cubes, powders and liquids, and a plastic tube. Activities are illustrated by photographs. (CS)

ED 196 660 SE 033 097
Watt, Daniel H. And Others
Teacher's Guide for Structures. Elementary Science Study.
Elementary Science Study, Newton, Mass.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ISBN-07-017696-5
Pub Date—70
Note—48p.; Photographs may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Construction (Process), Elementary Education, *Elementary School Science, *Science Activities, Science Course Improvement Projects, *Science Curriculum, Science Education

Presented are building activities, for elementary school children, using a variety of different materials. Weak materials, such as clay, straws and pins, paper tubes and index cards, are used as examples; structures built with these materials are displayed in photographs and discussed. Problems are suggested from which additional activities can be structured by teachers and/or students. Ways to extend building activities in the direction of large-scale construction are also described. (CS)

Secondary

Biology

ED 013 295 VT 000 624
USING SOIL AND OTHER PLANT GROWING MEDIA EFFECTIVELY. HORTICULTURE-SERVICE OCCUPATIONS, MODULE NO. 5.
Ohio State Univ., Columbus, Center for Voc. Educ.
Report Number OSU-AGDEX-200-017-5
Pub Date Aug 65
Note—117p.
EDRS Price MF-$0.50 HC-$4.76
Descriptors—*HORTICULTURE, *ORNAMENTAL HORTICULTURE OCCUPATION, *SOIL SCIENCE, *TEACHING GUIDES, *VOCATIONAL AGRICULTURE, BIBLIOGRAPHIES, HIGH SCHOOLS, UNITS OF STUDY (SUBJECT FIELDS).

One of a series designed to prepare high school students for horticulture service occupations, this module has as its major objective to develop the appreciations, understandings, and abilities needed to use plant growing media in growing horticultural plants. It was developed by a national task force on the basis of data from state studies. Subject matter areas are (1) origin, composition, and importance of soil, (2) suitability of various soils for plant growth, (3) watering practices related to soil structure, (4) recognition and use of soil conditioners, (5) soil mulch use, (6) soil fertility maintenance, (7) soil organisms, (8) soil preparation. Suggestions are included for introduction of the module, subject matter content, teaching-learning activities, instructional materials and references, and evaluative criteria. The module is scheduled for 35 hours of class instruction, 70 hours of laboratory and 25 hours of occupational experience. Teachers with a background in horticulture may use it to plan a unit for less able high school students with an occupational goal in ornamental horticulture. This document is available for a limited period as part of a set (VT 000 619 - 000 631) for $7.25 from the Center for Vocational and Technical Education, The Ohio State University, 980 Kinnear Road, Columbus, Ohio 43212. (JM)

ED 034 676 SE 006 771
Busch, Phyllis S.
SPRUCE Discovery Manual, 169 Investigations Indoors and Outdoors.
Ulster County Board of Cooperative Education Services, New Platz, N.Y.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Elementary and Secondary Education.
Pub Date [69]
Note—60p.
EDRS Price MF-$0.50 HC-$3.10
Descriptors—*Biology, *Conservation Education, Ecology, *Elementary School Science, *Instructional Materials, *Outdoor Education, Science Activities, Teaching Guides
Identifiers—ESEA Title III

Contained are instructional materials developed by the Science Project Related to Upgrading Conservation Education ("SPRUCE"). It is designed for use with the SPRUCE "Discovery Box" and contains twenty-one sets of investigations based on the twenty-one packets of specimens in the box: three sets are recommended for each of Grades K through 6. Each of the twenty-one topics is introduced by a "-background" section giving the rationale of the investigations and background information for the teacher. This is followed by four to ten "investigations"--questions and suggested activities which require students to observe and compare, sometimes to do simple experiments, and usually to extend their observations outside the classroom. The early topics emphasize the use of the senses in observing, later ones enable students to make discoveries about the characteristics of organisms and habitats. Themes which run through the investigations are constant change in nature and the interaction between organisms and their environments. The introduction to the manual describes the approach of the materials and makes a plea for improved conservation education. Ways in which this can be fitted into the general curriculum are suggested. The contents of the "Discovery Box" are not listed, but can be inferred from the background sections and investigations. This work was prepared under an ESEA Title III contract. (EB)

ED 037 343 SE 008 003
Bingman, Richard M. Ed.
Inquiry Objectives in the Teaching of Biology.
Biological Sciences Curriculum Study, Boulder, Colo.; Mid-Continent Regional Education Lab., Inc., Kansas City, Mo.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date Sep 69
Contract—OEC-3-7-062876-3076
Note—153p.
EDRS Price MF-$0.75 HC-$7.75
Descriptors—*Affective Objectives, Behavioral Objectives, *Biology, Cognitive Objectives, *Critical Thinking, *Educational Objectives, *Inquiry Training, Secondary School Science
Identifiers—Biological Sciences Curriculum Study

Five perspectives are identified for viewing inquiry: "Guiding Principles: (for example the antecedent-consequent principle), Inquiry Factors or logical steps in inquiry, Behavioral Objectives, Affective or Attitudinal Qualities, and Inquiry into Inquiry. Many components of these perspectives are enumerated, together with related student behaviors which would exemplify the components. Two examples of class discussion which illustrate inquiry into inquiry are given and analyzed in terms of strategy. The "interim summaries" of the Invitations to Enquiry from the BSCS "Biology Teachers Handbook" are printed as an appendix, as also is the paper (Mendel's "Experiments in Plant Hybridization") on which the class discussions were based. An extensive annotated bibliography on behavioral objectives and inquiry teaching in biology is divided into five sections: Behavioral Objectives - Some Considerations, The Inquiry Process, Inquiry as a Teaching Strategy, Preparing the Teacher for Inquiry, and Evaluating the Inquiry Process. (EB)

ED 045 381 SE 009 888
Phare, Wayne And Others
Life Science, A Process Approach, Second Edition: Revised, 1970.
Edmonton Public School Board (Alberta).
Pub Date 70
Note—321p.
EDRS Price MF-$1.25 HC-$16.15
Descriptors—*Biology, *Curriculum, Ecology, Elementary School Science, Embryology, instruction, *Instructional Materials, Physiology, Secondary School Science, *Teaching Guides

Seventeen scientific processes are identified and annotated; some suggestions for activities to demonstrate them are given. These processes are used as headings in the teacher's guide to succeeding units on biological classifications, microbiology, physiology of plants and animals, chick embryology and ecology. Similar headings are usually used in the exercises provided in the student's section, which gives detailed instructions for experimental procedures and has questions to guide analysis of the data. A guide to collecting and culturing fresh water organisms, and keys to amphibians, reptiles, insects, and fishes of Alberta are appended. (AL)

ED 052 000 SE 010 153
DISCUS Seventh Grade, Life Sciences, Part One.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date Sep 69
Note—180p.; Revised September 1, 1969
Available from—DISCUS, 1011 Gilmore Street, Jacksonville, Florida 32204
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Biology, *Disadvantaged Youth, *Instructional Materials, Laboratory Procedures, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the first volume of a two volume, one year program in life science and contains these three units and activities: Measurement, 7 activities; Ecology, 12 activities; and Energy Processes, 24 activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally includes a list of required equipment for small group activities, introduction and procedures, and fill-in questions relating to the completed activity. The volume begins with extensive "guidelines for creating an appropriate classroom environment." (PR)

ED 052 001 SE 010 154
DISCUS Seventh Grade, Life Sciences, Part Two.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date Mar 70
Note—150p.; Second Semester
Available from—DISCUS, 1011 Gilmore Street, Jacksonville, Florida 32204
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Biology, *Disadvantaged Youth, *Instructional Materials, Laboratory Procedures, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the second volume of a two volume, one year program in life science and contains these two units and activities: Reproduction and Development, 21 activities; and Genetics, 10 activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally includes a list of required equipment for small group activities, a short background reading and procedure, and fill-in questions relating to the completed activity. Included is an addendum which lists major concepts and suggested review and test questions for each unit in the two volumes. (PR)

ED 053 982 24 SE 012 309
Pfeiffer, Carl H.
Matter-Energy Interactions Relating to Life on Earth. Science II and IIA.
Monona Grove High School, Monona, Wis.; Wisconsin State Dept. of Education, Madison.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-0646
Pub Date 68
Note—481p.; Page 2 is missing
EDRS Price MF-$0.65 HC-$16.45
Descriptors—Biology, Chemistry, *Fused Curriculum, *Instructional Materials, Integrated Curriculum, Interdisciplinary Approach, *Science Activities, *Secondary School Science, *Workbooks

The two student notebooks in this set provide the basic course outline and assignments for the second year of a four year senior high school unified science program. The two volumes contain these four units: Expansion of Ideas About the Nature of Matter, Characteristics of Living Matter, Mechanisms of Life Processes, and Patterns of Change. The major portion of the first unit is devoted to basic chemistry, and the unit on patterns of change involves lessons and activities in heredity, population dynamics, and evolution. The materials in the notebook for each of the sub-units include: a list of required and recommended readings from various other books; questions for consideration in introducing a lesson; a brief background reading; a basic outline of the lectures with space provided within the outline for notes; laboratory activities and investigations; laboratory problem reports and other kinds of assignments (discussion questions, completion questions, problems); and summary statements and review questions. Numerous diagrams and illustrations are included. (PR)

ED 062 177 SE 013 640

Authorized Course of Instruction for the Quinmester Program. Science: Introduction to Anatomy and Physiology; Human Reproduction; Man and Disease; Man's Senses; and Introduction to the Human Body.

Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—96p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Bibliographies, *Biology, Films, *Instruction, Laboratory Procedures, *Objectives, *Physiology, Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—Quinmester Program

Performance objectives are stated for each of the five secondary school units included in this package of instructional guides prepared for the Dade County Florida Quinmester Program. All five units are concerned with aspects of physiology; three require no prerequisite study of biology ("Introduction to the Human Body," "Man and Disease," and "Man's Senses"), but two assume a minimal biology background ("Introduction to Anatomy and Physiology," and "Human Reproduction"). Each booklet contains a brief course outline, a list of relevant state-adopted textbooks, additional references, a catalog of visual aids available from the county visual aids center, and a list of experiments, demonstrations, and projects suitable for student and teacher use. Few experimental details are given, but reference is made to the appropriate pages in textbooks or teacher's sourcebooks. Some original projects are described in some of the booklets. A master sheet relating each of the suggested activities to the stated objectives is appended to each unit. (AL)

ED 062 179 SE 013 642

Authorized Course of Instruction for the Quinmester Program. Science: Genetics; Continuity of Life; and Perpetuating the Species.

Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—59p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Course Content, *Genetics, Instruction, *Objectives, Reproduction (Biology), Secondary School Science, Sex Education, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

Each of the three secondary school science units, prepared for the Dade County Florida Quinmester Program, concerns some aspects of genetics. "Genetics" requires previous study of biology and concentrates on in-depth study of the nature, transmission, and function of the genetic material. There are no formal prerequisites for the units "Perpetuating the Species" and "Continuity of Life," both concerned with basic principles of animal and plant reproduction and genetics. Each unit contains a list of performance objectives, a synoptic course outline, recommended instructional activities and student laboratory exercises (details are not included, but reference to the appropriate source is made), a list of state-adopted texts, ideas for projects and reports, and a list of visual aids available from the county and other sources. There are extensive reference lists. A chart relating each suggested activity to specific objectives is appended to each booklet. (AL)

ED 063 464 VT 015 228

Industrial Prep, Volume Two, Sophomore Year—Biology, English, Architecture, Occupations.

Hackensack Public Schools, N.J.
Report No—CVTE-E-8
Note—264p.; PAES Collection
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Architecture, Audiovisual Aids, Behavioral Objectives, Bibliographies, *Biology Instruction, *Career Education, Curriculum Guides, Developmental Programs, *English Curriculum, Grade 10, Industrial Education, Interdisciplinary Approach, Learning Activities, Lesson Plans, Resource Materials, *Teaching Guides, Thematic Approach, Vocational Education, Worksheets
Identifiers—Career Exploration

Currently relevant topics in English, biology, architectural skills, and occupations are presented in four teaching units for Grade 10 by means of model lesson plans, unit projects, and a variety of student worksheets. Supplementing the teaching guide are lists of resource and reference ideas ranging from visual aids to vocabulary terms and learning activities. As the second volume in a 3-year comprehensive interdisciplinary program in industrial preparation for vocational students, the guide represents a part of a year-long developmental program with a laboratory approach. Approximately half of the volume consists of four separate thematic units aimed at developing language arts communication skills within the English curriculum. The four subjects discussed are (1) newspapers and magazines as examples of mass media, (2) self-understanding derived from discussions of speech, psychology, and literature topics, (3) photography, and (4) correlated language arts activities. Methods of implementing behavioral objectives for each outlined unit are suggested in the detailed unit and program introductions. The volume is planned for use with four others, available as VT 015 227-VT 015 231 in this issue. (AG)

ED 064 097 SE 013 706

Chemistry of Living Matter, Energy Capture & Growth, Parts Three & Four of an Integrated Science Sequence, Student Guide, 1971 Edition.

Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—227p.
EDRS Price MF-$0.65 HC-$9.87
Descriptors—Biochemistry, *Chemistry, *Conceptual Schemes, Energy, Instructional Materials, Integrated Curriculum, *Interdisciplinary Approach, Organic Chemistry, *Secondary School Science, *Unified Studies Programs
Identifiers—Portland Project

This student guide is divided into two sections, "Chemistry of Living Matter" and "Energy Capture and Growth," constituting parts three and four of the third year of the Portland Project, a three-year high school integrated science curriculum. The underlying intention of the third year is to study energy and its importance to life. Energy-related concepts considered in year one and two, and the concepts related to atomic structure and particle phenomena considered earlier in the third year are further built upon in this volume by these chapters: monomers and how they are built; some chemistry of simple carbon compounds; polymers or stringing monomers together; polymers in 3D or the shape of things to come; where the action is-the active site; polymers to polymers; genes, proteins and mutations; energy capture; energy consumption and metabolism; and metabolism and genes. Reading assignments and experiments for the third year are contained in the student guide. Half of each page is left blank for the purpose of taking notes. (Additional information about the Portland Project in integrated science may be found by seeing SE 013 702 - 705.) (PR)

ED 064 131 SE 013 861

All Around You, An Environmental Study Guide.

Department of the Interior, Washington, D. C. Bureau of Land Management.
Pub Date 71
Note—139p.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C., 20402 (Stock No. 2411-0035 $1.50)
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Ecology, *Environmental Education, Intermediate Grades, *Learning Activities, Natural Resources, Perception, Secondary Grades, *Skill Development, *Teaching Guides

An understanding of the basic environmental interrelationships and problems, the development of investigative and problem solving skills, and individual motivation to help solve environmental problems are the objectives of these learning activities, designed for upper elementary and junior high grades. Nature and ecological relationships are stressed in the three sections: (1) Awareness, (2) The Urban Ecosystem, and (3) Nature's Ecosystem. Teacher's Pages, accompanying each section, provide perspectives on the subject content. Activities begin in the classroom and move outside to the schoolyard, the town, and natural or rural areas. They require finding answers to questions—through practical investigation, through laboratory and library research, and through talking with knowledgeable people. Appendices offer a vocabulary of environmental terms, two bibliographies—one for young readers and one for advanced readers, and organizations to contact for assistance with environmental studies. (BL)

ED 065 362 24 SE 014 465

Boles, Ronald J.

The Feasibility of Teaching Biology Via the Sociohistorical Approach.

Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Report No—TR-66
Bureau No—BR-5-0216
Pub Date Nov 68
Contract—OEC-5-10-154
Note—42p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum Development, Instruction, Science Education, *Science History, *Secondary School Science, *Social Environment, Social Factors

The investigator taught all experimental classes during the 12 days of instruction, utilizing ten units of a locally-developed text, a test based on the materials, and a series of slides and related discussion. The experimental group included 97 subjects enrolled in three classes studying second-year biology and one class studying tenth-grade social studies; the control group included 108 students enrolled in five classes studying second-year biology. Three subscores (biological concepts, nature of the scientific enterprise and the work of scientists, and social implications of the concepts) and a total score were obtained from the 90-item multiple-choice test administered to experimental and control classes as both a pretest and a posttest. Significant achievement gain on the three subscores and the total score was found for all classes in the experimental group. The control group showed no significant gains. In responding to a student questionnaire, a majority of the students (73 percent) expressed a positive opinion about the interest potential of the reading material, and a majority (57 percent) also indicated that the reading material was less difficult than that ordinarily experienced in biology classes. It was concluded that the performance of the experimental classes met the criteria under which the socio-historical approach was to be judged acceptable. (Author/CP)

ED 067 299 SE 014 902

Bemiss, Clair W.

Teachers Curriculum Guide for Field Ecology.

Brevard County School Board, Cocoa, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 72
Note—383p.
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Ecology, *Environmental Education, *Field Studies, Instructional Materials, Investigations, Learning Activities, *Secondary Grades, *Teaching Guides
Identifiers—ESEA Title III

Focusing upon a working knowledge of ecological principles as a requisite for today's society, this teacher's guide suggests numerous field studies which make pertinent use of these principles. It is designed to serve as an aid in planning student-centered activities which allow for understanding and improving the ecosystem in which they are an integral part. To assist the teacher with field activities, a series of descriptions of Brevard County, Florida, plant and animal communities is provided. The major section of the guide suggests field investigations in several areas: biomes and ecosystems, population and communities, nutrition web, aquatic ecology, and man vs. nature. Background information, purpose of the activity, materials required, and procedures to follow are enumerated with diagrams and charts drawn when necessary. Also included are ideas for water and sewage analysis, a listing of possible case studies relevant to ecological problems in Florida, and a review of procedures in selecting and developing study sites for an ecology improvement project. Miscellaneous teacher reference and resource material is appended. This work was prepared under an ESEA Title III contract. (BL)

ED 070 907 AC 014 049

Life Functions and Cells: Level II, Unit 7, Lesson 1; Cell Structure: Lesson 2; Tissues, Organs, Systems: Lesson 3; Growth and Nutrition: Lesson 4; Metabolism: Lesson 5. Advanced General Education Program. A High School Self-Study Program.

Manpower Administration (DOL), Washington, D. C. Job Corps.

Report No—PM-431-52; PM-431-53; PM-431-54; PM-431-55; PM-431-56

Pub Date Nov 69

Note—184p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Academic Education, Achievement Tests, *Autoinstructional Aids, Biology, *Course Content, Credit Courses, *General Education, Health Education, Human Body, *Independent Study, Secondary Grades

This self-study program for high-school level contains lessons on: Life Functions and Cells; Cell Structure; Tissues, Organs, Systems; Growth and Nutrition; and Metabolism. Each of the lessons concludes with a Mastery Test to be completed by the student. (DB)

ED 070 912 AC 014 054

Plants and Photosynthesis: Level III, Unit 3, Lesson 1: The Human Digestive System: Lesson 2; Functions of the Blood: Lesson 3: Human Circulation and Respiration: Lesson 4; Reproduction of a Single Cell: Lesson 5; Reproduction by Male and Female Cells: Lesson 6; The Human Reproductive System: Lesson 7; Genetics and Heredity: Lesson 8; The Nervous System: Lesson 9; The Glandular System: Lesson 10. Advanced General Education Program. A High School Self-Study Program.

Manpower Administration (DOL), Washington, D C. Job Corps.

Report No—PM-431-84; PM-431-85; PM-431-86; PM-431-87; PM-431-88; PM-431-89; PM-431-90; PM-431-91; PM-431-92; PM-431-93

Pub Date Nov 69

Note—365p

EDRS Price MF-$0.65 HC-$13.16

Descriptors—*Academic Education, Achievement Tests, *Autoinstructional Aids, Biology, *Course Content, Credit Courses, *General Education, Human Body, *Independent Study, Photosynthesis, Plant Growth, Secondary Grades

This self-study program for the high-school level contains lessons in the following subjects: Plants and Photosynthesis, The Human Digestive System, Functions of the Blood, Human Circulation and Respiration, Reproduction of a Single Cell, Reproduction by Male and Female Cells, The Human Reproductive System; Genetics and Heredity, The Nervous System, and The Glandular System. Each lesson concludes with a Mastery Test to be completed by the student. (DB)

ED 071 264 EC 050 872

Me and My Environment. Unit I: Exploring My Environment.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

Pub Date 72

Note—327p.

EDRS Price MF-$0.65 HC-$13.16

Descriptors—Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Guidelines, Inquiry Training, Instructional Materials, Lesson Plans, Mentally Handicapped, Problem Solving, Student Behavior

Presented is the experimental edition of Unit I: Exploring My Environment, which consists of 29 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Seven to 12 activities for each of the three core study areas within Unit I are given of which the following are examples: making a menu, sniffing around, forming categories, and reading a thermometer. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The three cores are sensing the environment, investigating the environment, and landmarks in the environment. The ecological theme stressed is the interrelationships of environmental components. Inquiry skills seen to be developed are observing and identifying. Problem solving skills emphasized are experimenting and knowing what the problem is and what to do about it. Environmental elements considered are space and shelter. Behavioral objectives include the development in the student of a sense of self-identity and an attitude of inquiry. (See EC 050 871, and EC 050 873 through EC 050 875 for related curriculum guides.) (DB)

ED 071 265 EC 050 873

Me and My Environment. Unit II: Me as a Habitat.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

Pub Date 72

Note—274p.

EDRS Price MF-$0.65 HC-$9.87

Descriptors—Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Guidelines, Inquiry Training, Instructional Materials, Lesson Plans, Mentally Handicapped, Problem Solving, Student Behavior

Presented is the experimental edition of Unit II: Me as a Habitat, which consists of 19 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Five to eight activities for each of the three core study areas within Unit II are given of which the following are examples: seeing is believing, drinking microbes, venereal disease in action, smoking in action, and the use and misuse of drugs. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The three cores study microbes, disease, and environmental choices. The ecological theme stressed is diversity and pattern. Inquiry skills seen to be developed are associating and describing. Problem solving skills emphasized are recording data and discussion and treatment of group data. Environmental elements considered are living things. A desired behavior outcome is skill in communication about the child's environment. (For related curriculum guides see EC 050 871, EC 050 872, EC 050 874 and EC 050 875.) (DB)

ED 071 266 EC 050 874

Me and My Environment. Unit III: Energy Relationships in My Environment.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

Pub Date 72

Note—327p.

EDRS Price MF-$0.65 HC-$13.16

Descriptors—Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Guidelines, Inquiry Training, Instructional Materials, Lesson Plans, Mentally Handicapped, Problem Solving, Student Behavior

Presented is the experimental edition of Unit III: Energy Relationships in My Environment, which consists of 25 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Five to eight activities for each of the four core study areas within Unit III are given of which the following are examples: growing plants, chemical energy, measuring energy values, the food chain game, and the green machine. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The four cores consider an introduction to energy, energy in food, energy flow through food chains and webs, and food making in plants. The ecological theme developed is the complementarity of organisms and environment. Inquiry skills seen to be developed are comparing and translating. Two problem solving skills emphasized are explaining and defending. The environmental element considered is energy. A desired behavior outcome is recognition of the child's dependence on his biological environment. (For related curriculum guides see EC 050 871 through EC 050 873 and EC 050 875.) (DB)

ED 071 267 EC 050 875

Me and My Environment. Unit IV: Transfer and Cycling of Materials in My Environment.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

Pub Date 72

Note—274p.

EDRS Price MF-$0.65 HC-$9.87

Descriptors—Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Guidelines, Inquiry Training, Instructional Materials, Lesson Plans, Mentally Handicapped, Problem Solving, Student Behavior

Presented is the experimental edition of Unit IV: Transfer and Cycling of Materials in My Environment, which consists of 29 life science curriculum activities intended for the 13-to-15-year-old educable mentally retarded child. The curriculum guide is being used in the final field test prior to revision. Stressed throughout the program are ecological themes, inquiry skills, problem solving skills, environmental elements, and applicational behaviors and attitudes. Eight to 12 activities for each of the three core study areas within Unit IV are given of which the following are examples: plant and animal hunt, making a pill bug habitat, the hamburger lab, garbage, and planting in compost. Activities are organized into materials, teaching strategies, and anticipated student behaviors. The three cores consider energy and material transfer, decomposers in the environment, and garbage and the environment respectively. The ecological theme developed is the cyclic nature of processes, the inquiry skill seen to be developed is guessing and applying. Two problem solving skills emphasized are identifying controls and drawing conclusions. The environmental element considered is air. A desired behavior outcome is skill in personal body care. (For related curriculum guides see EC 050 871 through EC 050 874.) (DB)

ED 079 024 SE 014 876

Silver, Barbara A.

Animal Structures and Functions, Science (Experimental): 5314.13.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—24p., An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study

(Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed to introduce the student to the relationship between structure and function in the animal kingdom, with emphasis given to: (1) the evolution of physiological systems in the major animal phyla, (2) the complementarity of structure and function, and (3) the concept of homeostasis. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, and topics for student projects, reports, discussions, and additional activities. Also listed are relevant films, transparencies, and models available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 029 SE 014 890
Payne, Leonard O.
Introduction to the Plant World, Science (Experimental): 5311.11.
Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—21p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed as a laboratory-oriented course for very low achievers to show how plants are involved in every aspect of their lives. Detailed practical experience in handling and investigating plants, and the use of films, models, and field trips are combined with basic minimal research to guide the student to a better understanding of the importance of the plant kingdom. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, field trips, speakers or resource people, and topics for student projects, reports, and additional innovative activities. Also listed are related problems, and relevant films and models available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 030 SE 014 894
Weiss, Alan And Others
The Nervous System, Science (Experimental): 5363.02.
Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—18p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed as an intensive in-depth study of the nervous impulse, neurons, brain, spinal cord, and sensory organs. Also included is a study of the endocrine system in its role of maintaining homeostasis. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, speakers, and topics for student projects and reports. Also listed are relevant films, film loops, slides, film strips, and transparencies available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 031 SE 014 901
Parcell, Louise
The World of Plants, Science (Experimental): 5311.13.
Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—25p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed as a survey course of the plant kingdom, including poisonous, ornamental, and edible plants of South Florida, their structures and functions. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, field trips, speakers, and topics for student projects, reports, discussions, and additional innovative activities. Also listed are related mathematics problems, and relevant films, transparencies, slides, filmstrips, models, videotapes and records available from the Dade County Audiovisual Center. Other audiovisual materials and resources are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 099 SE 016 415
Ecological Investigations, Curriculum Guide.
North Carolina State Dept. of Public Instruction, Raleigh.; Washington City Board of Education, N.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [72]
Note—194p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Curriculum Guides, *Ecology, Environmental Education, Fundamental Concepts, Instructional Materials, *Investigations, Learning Activities, *Natural Resources, *Secondary Grades, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—ESEA Title III

Activities which stress ecological concepts make up the major portion of this curriculum guide. Designed as a 12 week mini-course for students in grades eight and nine, the guide first presents the course schedule, including time requirements, lists the ecological concepts to be studied, and correlates the concepts with the activities. Following an Orientation unit, the major topics or units of study include: Introduction to Interrelationships, Nature's Law of Supply and Demand, To Each His Own, "The Only Thing Constant is Change," and Adversity and Diversity. Each unit is composed of a series of pre, major, and post-activities beginning with a general overview indicating the title of the unit, time allotments, purpose or objective, and abstract of the content. Individual activities enumerate, where appropriate, specific goals, background information, major points to emphasize, teaching procedures, materials required, and supplemental activities or information. A variety of media and processes is suggested to allow for flexibility and use of the material at any grade level. This work was prepared under a contract for an ESEA Title III project, "Environmental Science Study Curriculum." (BL)

ED 079 133 SE 016 510
Basnett, Fred D.
Agricultural Biology, Science (Experimental): 5314.09.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—24p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Agricultural Education, Behavioral Objectives, *Biology, Instruction, Instructional Materials, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed as a laboratory study of soils, plants, crop improvements and pesticides, and gives consideration to fish farming, tropical fish, and careers in agriculture. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, discussion questions and reports. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other course materials are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 134 SE 016 511
Silver, Barbara A.
Investigating Intricacies of Life Science, Science (Experimental): 5334.02.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—16p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed for the student who does not read well or who has been unsuccessful in previously attempted science courses. It is composed of a series of suggested activities selected to give the student a brief experience in many areas of the world of living things. Emphasis is on the study of living things other than Man, and no attempt has been made to develop the topics in depth. The booklet lists the relevant state-adopted texts, suggests other references, and states the performance objectives for the unit. It provides an outline of the course content, makes suggestions for the implementation of the course, and provides a sample work sheet. Fifty-seven student activities are described and related to specific performance objectives, references, and appropriate films available from the Dade County Audiovisual Center. (JR)

ED 079 135 SE 016 512
Basnett, Fred D.
Plant Economics, Science (Experimental): 5314.07.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—20p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction was designed for the slow reader and terminal student, and consists of a study of the economic value of plants and a consideration of landscaping, gardening and horticulture for fun and profit. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, reports, and discussions. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other materials and resources are recommended, and a master sheet is provided relating each suggested activity to the specific performance ojectives. (JR)

ED 079 137 SE 016 514
McCarthy, Nancy
What Makes Man Go?, Science (Experimental): 5334.01.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—18p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Biology, Instruction, Instructional Materials, Objectives, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction was designed for the terminal science student who does not read well or who has been unsuccessful in previously attempted science courses. The course is composed of a series of suggested activities selected to give the student a brief experience in human biology. No attempt has been made to develop the topics in depth. The booklet lists the relevant state-adopted texts, suggests other references, and states the performance objectives for the unit. It provides an outline of the course content, makes suggestions for the implementation of the course, and provides a sample work sheet. Fifty-five student activities are described and related to specific performance objectives, references, and appropriate films available from the Dade County Audiovisual Center. (JR)

ED 079 138 SE 016 515

Kleinman, David Z.
Animals from the Outside In, Science (Experimental): 5314.01.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—22p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, *Curriculum Guides, Instructional Improvement, *Instructional Innovation, Resource Materials, Science Education, *Secondary School Science, Student Centered Curriculum, *Zoology
Identifiers—*Quinmester Program

Presented is an outline of a basic course (low level) in biology for students whose interest and background are very limited. The study and dissection of earthworm, crayfish, perch, and bird are included. A detailed study of the frog is undertaken as a representative of the animal kingdom. Performance objectives are presented, as well as a course outline based on a phylogenetic approach to the zoology course. A master sheet lists the objectives by number and itemizes the various texts involved with specific chapters noted. Laboratory activities, demonstrations, projects, suggested reports, field trips, films and film loops, as well as other curriculum events corresponding to each objective are included. Suggested innovative activities and additional references are also provided. (EB)

ED 079 139 SE 016 516

Adams, Joseph P.
Life in the Past - Biogeography, Science (Experimental): 5314.16.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—20p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, Earth Science, *Ecology, *Evolution, Genetics, *Geology, Science Education, Secondary School Science
Identifiers—*Quinmester Program

This biogeography module is designed for students wishing to study evolutionary interrelationships with the physical environment. Topics studied include various aspects of historical biogeography and evolution. Categories included are: (1) barriers to the dispersal or organisms, (2) the zoogeographic regions, (3) genetic change, (4) selection, and (5) the history of life. This course is suggested for students planning to major in biology or become professional biologists. The performance objectives are listed, the course outline presented and the entire curriculum presented. At the conclusion of the module it is hoped that the student will be able to discuss critically the future of man as a highly evolved species. (EB)

ED 079 140 SE 016 517

Cunn, William C.
Microbiology, Science (Experimental): 5314.17.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—17p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, *Curriculum Guides, Instructional Improvement, *Instructional Innovation, Instructional Materials, *Microbiology, Science Education, *Secondary School Science
Identifiers—*Quinmester Program

Presented is a course outline for the study of microorganisms, what they are, and how they solve the two basic problems of life - staying alive and reproducing. Much emphasis is placed on the physiological activities of bacteria. The course is designed for the average student in biology and could be used as a first course in biology. Experiments suggested are taken from three versions of the Biological Sciences Curriculum Study (BSCS) courses and the BSCS Laboratory Block, "-Microbes. Their Growth, Nutrition and Interactions." The performance objectives are listed, the course outline presented and the entire curriculum suggested. A variety of laboratory activities are suggested at many levels of sophistication. The author suggests the course be used involving a variety of teaching strategies. (EB)

ED 079 141 SE 016 518

Kleinman, David Z.
Your World and Welcome To It, Science (Experimental): 5314.03.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—23p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, Ecology, *Environmental Education, Instructional Materials, *Pollution, Resource Materials, Science Activities, Science Education, *Secondary School Science
Identifiers—*Quinmester Program

Presented is a beginning course in biology with emphasis on ecology for students with limited interest and few experiences in science. These students most likely will not take many more science courses. Included are the basic ecological concepts of communities, population, societies and the effects humans have on the environment. Like all other modules in the Quinmester Program, the performance objectives are listed and the course outline presented. The ecological study focuses on the flora and fauna found in South Florida. Main topics include: (1) Plant and Animal Populations and Communities, (2) Food Webs and Pollution, and (3) Prospects for the Future. The latter is based on the effects of increased population in South Florida. (EB)

ED 080 332 SE 016 427

Rhoden, Bruce
Learning Activity Package, Biology, LAPs 12, 13, 15, 17, and 18.
Ninety Six High School, S. C.
Pub Date [73]
Note—60p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, *Individualized Instruction, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

Included is a set of five teacher-prepared Learning Activity Packages (LAPs) for individualized instruction in topics in biology. The units cover the topics of individuals and populations, communities and ecosystems, diversity, plant functions, and animal functions. Each unit contains a rationale for the material; a list of behavioral objectives for the unit; a list of resources including texts (specifying reading assignments) and visual materials, activities, including laboratories when appropriate; a depth study; and a self-evaluation test. For other documents in this series, see SE 016 428. (JR)

ED 080 333 SE 016 428

Rhoden, Bruce
Learning Activity Package, Biology, LAPs 20, 30, 31, 32, and 33.
Ninety Six High School, S. C.
Pub Date [73]
Note—67p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, *Individualized Instruction, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

Included is a set of five teacher-prepared Learning Activity Packages (LAPs) for individualized instruction in topics in biology. The units cover the topics of genetic continuity, methods of investigation, cell biology, genetics, and animal physiology. Each unit contains a rationale for the material, a list of behavioral objectives for the unit; a list of resources including texts (specifying reading assignments) and visual materials; activities, including laboratories when appropriate; a depth study; and a self-evaluation test. For other documents in this series, see SE 016 427. (JR)

ED 080 371 SE 016 636

Esser, Robert
Biology [Sahuarita High School Career Curriculum Project.]
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—93p., Pagination not consecutive
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

This course entitled "Biology" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of 11 units of study, and 45 behavioral objectives relating to these units are listed. The topics covered include observation, measurement, scales and magnification, the microscope, characteristics of living things, observation and classifying, spatial relationships, constructing inferences and defining operationally, cells, plant reproduction, and heredity. The units provide a statement of the rationale, objectives, sources of information, a series of student activities, and answers to the activity problems. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 372 SE 016 638

Christensen, Larry
Advanced Biology [Sahuarita High School Career Curriculum Project.]
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—41p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, *Curriculum Guides, *Genetics, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials

This course in advanced biology is entitled "Advanced Genetics" and is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of seven units of study, and 15 behavioral objectives relating to these units are stated. The topics covered include a review of genetics, Drosophila characteristics, yeast irradiation, human genetics, investigating a yeast mutant, probability and Chi-square, and preparation of a scientific paper. The units provide a statement of the rationale, objectives, sources of information, a series of student activities, and a post-evaluation. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 373 SE 016 639

Christensen, Larry
Desert Biology [Sahuarita High School Career Curriculum Project.]
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—33p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

This course entitled "Desert Biology" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of seven units of study, and eight behavioral objectives relating to these units are stated. The topics covered include the selection of a study site, a climatic analysis, identification of plants and animals, plant sampling by the line intercept method, animal census methods, soil texture analysis, and the preparation of a scientific paper. The units provide a statement of the rationale, objectives, sources of information, a series of student activities, and a post-evaluation. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 374 SE 016 640
Esser, Robert
Anatomy External [Sahuarita High School Career Curriculum Project].
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—18p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Biology, Curriculum, *Curriculum Guides, Instructional Materials, Laboratory Manuals, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials

This course entitled "Anatomy External" is concerned with the dissection of the fetal pig, and is one of a series of instructional guides prepared by the teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of five units of study, and 13 behavioral objectives relating to these units are stated. The topics covered include the external anatomy of the fetal pig, the skeletal system, the muscular system, general internal anatomy, and the digestive system. The units provide a statement of the rationale, objectives, sources of information, and student activities including dissecting directions. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 375 SE 016 641
Esser, Robert
Botany [Sahuarita High School Career Curriculum Project.]
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—27p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, *Botany, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials

This course entitled "Botany" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of five units of study, and 20 behavioral objectives relating to these units are stated. The topics covered include the classification of plants, morphology, plant reproduction, seeds, and heredity. The units provide a statement of the rationale, objectives, sources of information, and a series of student activities. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 376 SE 016 642
Esser, Robert
Advanced Botany (Sahuarita High School Career Curriculum Project].
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—19p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, *Botany, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials

This course entitled "Advanced Botany" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of three units of study, and eight behavioral objectives relating to these units are stated. The topics covered include plant cells and taxonomy, functions and structures of plants, and plant growth and development. The units provide a statement of the rationale, objectives, sources of information, and a series of student activities. For related units in this series see SE 016 635 - SE 016 644. (JR)

ED 080 377 SE 016 643
Esser, Robert
Area Fish and Game Ecology [Sahuarita High School Career Curriculum Project.]
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—78p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, *Curriculum Guides, *Ecology, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials

This course entitled "Area Fish and Game Ecology" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of nine units of study, and 18 behavioral objectives relating to these units are stated. The topics covered include map projections, map symbols and contours, latitude and longitudinal, scale, using the contour line, plant life in the Sonoran Desert, mammals of the desert, birds, and fish. The units provide a statement of the rationale, objectives, and student activities. For related units in this series see SE 016 635 - SE 016 444. (JR)

ED 081 611 SE 016 628
Teacher's Guide, Ecology, Grade 10.
Yadkin Valley Economic Development District, Inc., Walnut Cove, N.C.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Pub Date [72]
Note—124p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Curriculum Development, *Ecology, Environmental Education, Grade 10, Instructional Materials, *Investigations, Learning Activities, Natural Resources, *Secondary School Science, *Student Projects, *Teaching Guides, Unit Plan

This teacher's guide has been constructed to assist in developing and implementing a life science course with an environment/ecological unit for Grade 10. Designed primarily for use with other science units, it offers numerous multidisciplinary activities which emphasize involvement in problem-solving through open-ended investigation rather than problem-doing only. Activity ideas range from field investigations of temperature and humidity, flying insects, trees, seed dispersal, and animal habitat to discussions of ecological succession at the community level; from a semester ecology project about ponds, data collection from soil studies, and ecology and natural resources projects to analysis of the population explosion, bird and plant relationships, and conservation practices. Resource material compiled in the final section gives an annotated film list and sources for free and inexpensive materials oriented to the tenth grade level. Related documents are SE 016 626 and SE 016 627. (BL)

ED 085 232 SE 016 637
Esser, Robert
High School Biology [Sahuarita High School Career Curriculum Project].
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—41p.; Pages 2,5,6,7,9 and 10 missing
Available from—ERIC/SMEAC, Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)
Document Not Available from EDRS.
Descriptors—*Biology, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

This course entitled "High School Biology: Introduction" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of six units of study, and 26 behavioral objectives relating to these units are stated. Also included are a brief introduction and an annotated list of relevant 16-mm films. The topics covered include observation, use of the microscope, characteristics of living things, cells, cell division, animal dissection, and systems and organs. The units provide a statement of the rationale, objectives, sources of information, a series of student activities, and answers to the activity problems. For related unit in this series, see ED 080 370 - ED 080 378. [Not available in hardcopy due to marginal legibility of original document.] (JR)

ED 086 522 SE 017 122
Climer, Robert R.
Human Ecology, Science (Experimental): 5365.60.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—16p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Behavioral Objectives, *Behavior Change, Biology, Curriculum Guides, Ecology, *Environmental Education, Human Development, *Instructional Materials, *Secondary School Science
Identifiers—*Quinmester Program

This course involves the scientific study of the close relationship between evolving human behavior and changing environmental conditions. No state-adopted text is recommended for the course, but the use of several paperbacks, as well as Scientific American Reprint Series, is highly recommended. Supplementary texts are suggested. Eight performance objectives are listed. The course outline includes five major concepts: (1) Human Behavior in Response to the Environmemt; (2) Comparison of Behaviors in Lower Animals and Man; (3) Cultural Developments and Their Effects on the Behavior of Man; (4) Behavioral Conflicts of Man in Modern Society; and (5) Projecting Future Society and the Future Behavior of Man. Demonstrations by resource people are suggested. Student-performed activities suggested include reports, projects, films, and film strips. An extensive list of discussion questions is presented, as is a master sheet coordinating the entire curriculum. (Author/EB)

ED 086 524 SE 017 124
Jenks, Lois
Prehistoric Life, Science (Experimental): 5311.15.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—21p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, Biology, *Curriculum Guides, *Earth Science, Geology, *Instructional Materials, *Junior High School Students, Science Education, Secondary School Science
Identifiers—*Quinmester Program

Presented is a survey course of the biological and geological history of the earth which includes: (1) theories of the formation of the earth, (2) theories of the formation of life, (3) geological eras (calendar), (4) fossil formation and fossil fuels, and (5) modern-day research. This course is intended for junior high level and no previous courses are required as indicators of student success. Three state-adopted texts are listed: Silver Burdett's "Earth Science," Houghton Mifflin's "Investigating the Earth," and Allyn and Bacon's "Exploring Earth Science." Eight performance objectives are stated. Experiments, drawn from several texts, are suggested as well as 14 individual student projects. A list of student reports, some meaningful field trips and a number of suggested guest speakers are recommended. Films, film loops, cassette tapes, film strips, transparencies, slides and models relevant to the course of study are cited, as well as suggested dicsussion questions. A complete reference list is also included in the syllabus along with a master sheet coordinating the course of instruction. (Author/EB)

ED 086 526 SE 017 126
Adams, Joseph P.
Theories of Evolution, Science (Experimental): 5315.42.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—22p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Behavioral Objectives, Biology, *Curriculum Guides, *Evolution, Instructional Aids, Instructional Films, *Instructional Materials, Science History, *Secondary School Science
Identifiers—*Quinmester Program

This is an in-depth course of study of the historical attempts to explain the evolutionary process and of recent developments pertinent to the study of biomedical evolution. Topics included in the module are: (1) ancient concepts of the evolutionary process; (2) various aspects of Lamarckism, Darwinism and neo-Darwinism, including substantiating arguments for Darwinism and opponents to Darwinism; (3) biochemical evolution, and (4) metaphysical considerations concerning aspects of evolutionary theory. The course is designed primarily for students interested in doing advanced work in biology or in biochemistry. The majority of the course was derived from "The Orion Book of Evolution" (Jean Rostand), "Space Life Sciences" (Cyril Ponnamperuma and Norman Gabel), and "The Science of Biology" (Paul Weisz). Thirteen performance objectives are cited. An extensive course outline is presented which includes the presentation of numerous theories related to evolutionary process. Audio-visual aids including films, transparencies, and equipment are suggested. A master sheet coordinates the entire curriculum event. (Author/EB)

ED 086 552 SE 017 224
Awkerman, Gary L.
Animals of the Sea: Coelenterates, Protozoa, and Sponges.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—82p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, Environmental Education, *Instructional Materials, *Marine Biology, *Oceanology, *Secondary School Science, Study Guides, *Zoology
Identifiers—Elementary Secondary Education Act Title III

These three units are designed for use with standard science curricula. These publications, relating to animals of the sea, are: Protozoa, Sponges, and Coelenterates. Included are teacher guides, student activities, and demonstrations designed to impart ocean science understanding to high school students. Objectives to be attained from the unit on Protozoans include: (1) identification of radiolarians, foraminiferans and tintinnids; (2) descriptions of life processes in these protozoans; and (3) identification of oceanic sediment produced by radiolarians and foraminiferans. After studying the unit on Sponges, students should be able to: (1) list the classes of sponges; (2) describe the life functions and habits; and (3) describe sponge reproduction and its importance to sponge industry. At the end of the unit on Coelenterates, students should be able to: (1) list the classes; (2) describe locomotion and feeding habits; and (3) describe relationship between the reproductive stages representing alternation of generation phenomena. This work was prepared under an ESEA Title III contract. (Author/EB)

ED 086 553 SE 017 225
Awkerman, Gary L.
Aspects of Marine Ecology.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—55p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, *Ecology, Environmental Education, *Instructional Materials, *Marine Biology, Oceanology, *Secondary School Science, *Study Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This publication is designed for use in standard science curricula to develop oceanologic manifestations of certain science topics. Included are teacher guides, student activities, and demonstrations to impart ocean science understanding, specifically, aspects of marine ecology, to high school students. The course objectives include the ability of students to: (1) identify the fundamental source of energy for the marine ecosystem; (2) describe the functions of producers, consumers, and decomposers in the ecosystem; (3) identify typical food webs and food chains; (4) explain relationships between local nutrient depletion and stratification of ocean circulation; and (5) discuss the effects of pollution on the marine ecosystem. This work was prepared under an ESEA Title III contract. The reference page will not reproduce clearly. (Author/EB)

ED 086 554 SE 017 226
Awkerman, Gary L.
Estuaries.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—54p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, *Environmental Education, *Instructional Materials, *Marine Biology, Natural Sciences, *Oceanology, *Secondary School Science, Study Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This publication is designed for use in standard science curricula to develop oceanologic manifestations of certain science topics. Included are teacher guides, student activities, and demonstrations designed to impart ocean understanding to high school students. When the student has completed this unit, he should be able to: (1) define an estuary; (2) describe environmental fluctuations of an estuary; (3) describe five types of estuaries; (4) list biological characteristics of estuaries; and (5) describe the most important function of a crab's shell. Two other units are included in this publication--Estuaries and Man, and Destruction and Restoration. The five major areas in which estuaries are important to man (harbors, sites of industry, fishing grounds, sea farms, and recreational centers) are included in this unit on marine biology. This work was prepared under an ESEA Title III contract. (Author/EB)

ED 086 555 SE 017 227
Awkerman, Gary L.
Marine Biological Field Techniques.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—28p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Curriculum, Environmental Education, *Instructional Materials, *Marine Biology, Natural Sciences, *Oceanology, Resource Materials, *Secondary School Science, *Study Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This publication is designed for use in a standard science curricula to develop oceanologic manifestations of certain science topics. Included are teacher guides, student activities, and demonstrations designed to impart ocean science understanding to high school students. It could be a useful instructional tool for any high school student field trip experience. Suggestions for wearing apparel and necessary equipment are listed. Objectives to be gained by the students include: (1) to learn how to use the various nets for capturing marine life; (2) to identify the common organisms of Folly Beach; (3) to identify major beach zones; and (4) to define salinity and describe its principal effects on organisms. The publication includes pictorial representations of the various organisms in marine collections that can be obtained, equipment to be used, and diagramatic sketches of the field trip sites. This work was prepared under an ESEA Title III contract. (Author/EB)

ED 086 556 SE 017 228
Awkerman, Gary L.
Sea Changes. Topics in Marine Earth Science.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—27p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Earth Science, *Environmental Education, *Instructional Materials, *Marine Biology, Natural Sciences, *Oceanology, *Secondary School Science, Study Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This publication is designed for use in standard science curricula to develop oceanologic manifestations of certain science topics. Included are teacher guides, student activities, and demonstrations designed to impart ocean science understanding to high school students. The principal theme of Changes in the Sea is presented in this particular publication. Topics discussed include: (1) Continental Drift; (2) Shoreline Changes; (3) Sea Level Changes; (4) Beaches; (5) Nearshore Currents and Man-Made Structures; and (6) Estuaries. This particular publication is content-oriented rather than activity-oriented. This work was prepared under an ESEA Title III contract. (Author/EB)

ED 086 557 SE 017 229
Awkerman, Gary L.
Zones of Life in the Sea.
Charleston County School District, North Charleston, S.C.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [73]
Note—28p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biology, Conceptual Schemes, *Earth Science, *Environmental Education, Instructional Materials, *Marine Biology, Natural Sciences, *Oceanology, Secondary School Science, Study Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This publication is designed for use in standard science curricula to develop oceanologic manifestations of certain science topics. Included are teacher guides, student activities, and demonstrations designed to impart ocean science understanding. Specific learning objectives, the rationale, materials needed, and suggested teacher introductions are presented. The six student activities prepared should enable the students to achieve the suggested objectives: (1) to identify a number of oceanic zones; (2) to describe changes in environmental factors related to change in depth; (3) to identify zones of a beach; and (4) to describe the beach zones relative to diversity of organisms present. This work was prepared under an ESEA Title III contract. (Author/EB)

ED 089 041 CE 001 087
Biology II: Curriculum Guide.
Harlandale Independent School District, San Antonio, Tex. Career Education Center.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.
Pub Date [70]
Note—171p.
EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE
Descriptors—Audiovisual Aids, Bibliographies, *Biology, *Career Education, *Curriculum Guides, Educational Objectives, Educational Resources, Instructional Materials, Laboratory Experiments, Occupational Information, *Performance Specifications, Resource Materials, *Secondary Grades, Teaching Methods, Units of Study (Subject Fields)
Identifiers—Texas

The first 80 pages of the guide are arranged in vertical columns relating the biology curriculum concepts to curriculum performance objectives, career concepts and career performance objectives, suggested teaching methods, and resource materials. Career information on 41 occupations includes comments on what a person in the occupation does, the level of education required, approximate salary range, approximate number of people in the field, and employment opportunities. Space is provided for teachers' additions, deletions, notes, and criticisms, which will be use-

ful when the guide is revised. The next 50 pages contain biology laboratory exercises. Audio-visual source information, selected references, additional sources of career information, and periodicals are listed in the appendix. (AG)

ED 090 031 SE 017 613
Basnett, Fred D.
Ecology of Terrestrial Species of South Florida, Science (Experimental): 5365.62.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—22p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Behavioral Objectives, Biology, *Ecology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction is designed for the student interested in understanding the actions and interactions of plants and animals located in the South Florida environment and its many unique features such as the everglades and the seashore. It presents an in-depth study of a hardwood hammock, pine and palmetto community, sea strand community, and a grassland prairie. Limiting factors and research techniques are also examined. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, guest speakers, field trips, and topics for student projects, discussion questions and reports. Also listed are relevant films and filmstrips available from the Dade County Audiovisual Center. Reference books and other course materials are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 090 033 SE 017 621
Gunn, William C.
Physiology of Plants, Science (Experimental): 5315.41.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—19p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Behavioral Objectives, *Botany, Instruction, *Instructional Materials, *Physiology, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction deals with the physiological activities of plants. Attention is focused on the principles which underlie the activities of the typical green land plant. Emphasis is placed on biological processes such as photosynthesis, water transport, light responses, mineral nutrition, reproduction, and growth. The prerequisite for enrollment in the course is four Quinmester units in biology, and some experience in chemistry is suggested. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, field trips, and topics for student projects, discussion questions, and reports. Also listed are relevant films available from the Dade County Audiovisual Center. Reference books and Scientific American articles are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 091 233 SE 017 817
Reinhard, Diana Hereda
Plant Hormones: How They Affect Root Formation.
Agricultural Research Center (DOA), Beltsville, Md.
Pub Date Apr 74
Note—11p.; Science Study Aid No. 9
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 ($0.10)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Biology, *Botany, Instruction, *Instructional Materials, Learning Activities, Plant Growth, *Plant Science, Science Education, *Secondary School Science

This science study aid, produced by the U.S. Department of Agriculture, includes a series of plant rooting activities for secondary science classes. The material in the pamphlet is written for students and includes background information on plant hormones, a vocabulary list, and five learning activities. Objectives, needed materials, and procedures are specified for each of the activities. Questions to be answered by the students are included when appropriate. Supplementary activities are suggested. (DT)

ED 092 356 SE 017 611
Weiss, Alan And Others
Digestion, Excretion and Metabolism, Science (Experimental): 5346.03.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—15p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Behavioral Objectives, Biology, *Human Body, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction deals with a study of human physiology with emphasis on the process of digestion. The urinary system and urinary disorders are also discussed. The course is for the interested student and requires credit or background in previous biology programs. It is, in part, a second course in biology, but it is well within the range of the average student. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. A course outline is presented as well as suggested laboratory experiments, projects, reports, field trips, and guest speakers. Visual aids relevant to the unit are listed to include films, film loops, slides, film strips, and transparencies. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 092 357 SE 017 616
Miley, James F.
Introduction to Ecology of South Florida Species, Science (Experimental): 5365.41.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—25p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Behavioral Objectives, *Ecology, Geology, Instruction, *Instructional Materials, Meteorology, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction deals with a study of South Florida as an ecosystem. Consideration is given to meteorological features, geological foundations, chemical analyses, and biotic communities characteristic of South Florida. A major attribute is the development of monographs about the unique natural wealth of the lower South Florida peninsula. It is required that a student should have satisfactorily completed course work in biology equivalent to one year before taking this course. Relevant state-adopted texts are listed in the booklet. It provides performance objectives and the course outline and suggests laboratory exercises, student projects, demonstrations, field trips, and guest speakers. Particular emphasis is placed on the use of monographs, and suggested topics with specific instructions are provided. Also listed are relevant films, slides, and models from the Dade County Audiovisual Center. Supplementary references are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 092 358 SE 017 617
O'Connor, Jim
Life Science Through Field Experiences, Science (Experimental): 5311.14.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—28p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Behavioral Objectives, Biology, Conservation Education, *Environmental Education, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Quinmester Program

This unit of instruction is concerned with briefly interpreting some major life science aspects of the South Florida environment and is dependent on outdoor laboratories, excursions, and ecology-oriented instructional materials. It is suggested that many of the instructional materials may need to be originated. To make collections on field trips is illegal without a permit; thus, information is provided to facilitate this request. No enrollment guidelines are suggested. State-adopted texts relevant to the course are listed. The performance objectives and course outline are presented in the booklet. Relevant publications are suggested and South Florida Environmental Science Media Units available from the Dade County Audiovisual Center are found in the unit. Suggested activities, guest speakers, and field trips are provided. Films available as well as slides, transparencies, records, and models are listed. A list of necessary materials to be purchased is included in the booklet. A master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 093 619 SE 017 108
Hershey, John T. And Others
A Curriculum Activities Guide to Birds, Bugs, Dogs, and Weather and Environmental Studies. Volume 5. 2nd Edition.
Institute for Environmental Education, Cleveland, Ohio.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Pub Date Aug 73
Grant—OEG-0-71-4622; OEG-0-72-5105
Note—159p.
Available from—Institute for Environmental Education, 8911 Euclid Avenue, Cleveland, Ohio 44106
EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE
Descriptors—Biology, *Curriculum Guides, Environment, *Environmental Education, Field Studies, Instruction, Meteorology, *Science Activities, Science Education, Secondary School Students, Teaching Techniques
Identifiers—*Institute for Environmental Education

This material is one publication of a series of documents available from the Institute for Environmental Education (Cleveland) and consists of a curriculum activities guide to birds, bugs, dogs, and weather and environmental studies. The first edition of this material was prepared by the Documentation Task Force of Project KARE, Philadelphia, and was revised by personnel at the institute. The guide is intended for use by teachers and students until they feel sufficiently confident to prepare their own materials and is organized into three sections: Chapter 1 is on awareness activities, 2 on transitional activities, and 3 on operational activities. Awareness activities, developed with process skills in mind, are designed to orient students toward a concern for environmental problems and a realization that the problems are appropriate subjects for study. Transitional activities are directed toward real community concerns. Operational activities are integrated with community efforts to solve environmental problems. The guide's format is that of a questioning sequence, using questions to (1) lead to the activity, (2) initiate the activity, (3) continue the activity, (4) expand the activity, and (5) evaluate the activity. Teachers using the guide are invited to use only those activities that are most appropriate to their situation. (PEB)

ED 093 690 SE 018 013
Schmalhofer, Ed And Others
Biology 306: Measurement and Instrumentation.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 21 Jan 74
Note—100p.; Page 42 not reproduced due to marginal legibility
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($2.00, make checks payable to the Del Mod System)
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Behavioral Objectives, *Biology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Del Mod System

A nine-week prerequisite course for biology students is presented in this monograph. A course outline is presented to provide the student with some idea of the topics and activities that he will encounter. A suggested pretest is included in the monograph which covers 32 objectives. Three Learning Activity Packages are presented. Package A - Introduction to Biology - includes suggested films, readings, lectures and written assignments to develop the meaning of biology, the history and importance of biology, the branches of biology and scientific methods. Package B - Introduction to Instrumentation - presents laboratory equipment and its use with greatest emphasis on optical instruments. Learning Package C - Introduction to Metric Measurement - includes reading assignments, experiences in measurement, and quizzes on this particular concept, as well as on the use of the Bunsen Burner and the thermometer. Four enrichment activities and four remedial activities are suggested and developed. Each of the Learning Activity Packages has 10-12 behavioral objectives. These are itemized and presented for the student and constitute the basis for all pre- and post-test items. (Author/EB)

ED 095 024 SE 018 182
Rhoden, Bruce
Learning Activity Package, Biology 102, (LAP) Studies 1, 3, and 4.
Ninety Six High School, S. C.
Pub Date [74]
Note—24p.; See ED 080 332 - 333 and SE 018 183 - 185 for related biology LAP materials
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Autoinstructional Programs, Biology, *Classification, *Energy, *Individualized Instruction, Instructional Materials, *Reproduction (Biology), Science Education, *Secondary School Science, Self Help Programs, Units of Study (Subject Fields)
Identifiers—LAP, Learning Activity Package

Included are three Learning Activity Package (LAP) studies for use in high school biology: Everything has a Place (Grouping and the Diversity of Life), Energy Relations, and Reproduction. Each LAP contains a rationale for teaching the material included, student objectives (stated in behavioral terms), a list of related resources (books, audiovisual aids), laboratory activities, and a student self-evaluation. (PEB)

ED 095 025 SE 018 183
Rhoden, Bruce
Learning Activity Package, Biology 103, (LAP) Study 19.
Ninety Six High School, S. C.
Pub Date [74]
Note—9p.; See ED 080 332 - 333 and SE 018 182 - 185 for related biology LAP materials
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, *Individualized Instruction, Instructional Materials, Learning Activities, *Reproduction (Biology), Science Education, *Secondary School Science, Self Help Programs, Units of Study (Subject Fields)
Identifiers—LAP, Learning Activity Package

Presented is a Learning Activity Package (LAP) study concerned with the study of biological reproduction. The LAP begins with the rationale for studying the reproductive process and is then divided into two sections. Contained within each section are student objectives (stated in behavioral terms), a list of resources (readings and problems, visuals), related laboratory activities, and a student self-evaluation. (PEB)

ED 095 026 SE 018 184
Rhoden, Bruce
Learning Activity Package, Biology 103, (LAP) Study 21.
Ninety Six High School, S. C.
Pub Date [74]
Note—5p.; See ED 080 332 - 333 and SE 018 182 - 185 for related biology LAP materials
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Biology, *Evolution, *Individualized Instruction, Instructional Materials, *Learning Activities, Science Education, Secondary School Science, *Self Help Programs
Identifiers—LAP, Learning Activity Package

Presented is a Learning Activity Package (LAP) study concerned with the concept of organic evolution. Contained in this LAP are the rationale for studying the concept, a list of objectives (stated in behavioral terms) for the student to accomplish, a list of reading references and audiovisual aids (filmstrips with cassette tapes, teaching tapes), and related laboratory activities. A self-evaluation form is the final item in the package. (PEB)

ED 095 027 SE 018 185
Rhoden, Bruce
Learning Activity Package, Biology 124, (LAP) Study 36.
Ninety Six High School, S. C.
Pub Date [74]
Note—8p.; See ED 080 332 - 333 and SE 018 182 - 184 for related biology LAP materials
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, *Ecology, Field Studies, *Individualized Instruction, Instructional Materials, Science Education, *Secondary School Science, Self Help Programs, Units of Study (Subject Fields)
Identifiers—LAP, Learning Activity Package

Presented is a Learning Activity Package (LAP) study on ecology. This LAP, designed for use as a part of a high school biology course, contains a rationale for teaching the topic, a list of student objectives (stated in behavioral terms), a list of resources (readings, audiovisual aids, handouts, student activities, group discussion topics), and a student self-evaluation. Each of the three sections of this LAP emphasizes field observation. (PEB)

ED 096 115 SE 018 011
Wheeler, Elaine
St. Marks High School General Biology Course.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date [73]
Note—91p.
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Biology, Curriculum Guides, Instruction, *Instructional Materials, Learning Disabilities, Science Education, *Secondary School Science, *Slow Learners, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This unit of instruction consists of a general biology course for secondary school students with learning disabilities or who are reluctant learners. All units include the objectives, list of new words and a list and type of activities to achieve the objectives. Student participation is emphasized. The students choose the type and sequence of the exercises to be done. Better readers help poorer ones. Students determine the number of activities they complete in each unit. The materials to be used and the source from which they can be obtained are presented. The evaluation process is outlined and a progress record form included. Each learning activity includes an introduction, presenting the concept to be learned, the purpose, the necessary materials and procedure, as well as a student report sheet. Extra credit activities and optional learning experiences are provided. (EB)

ED 096 117 SE 018 017
Henderson, Paula
pH [Measure of Acidity].
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—12p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with the study of the pH of given substances by using litmus and hydrion papers. It is a learning activity directed toward low achievers involved in the study of biology at the secondary school level. The time suggested for the unit is 25-30 minutes (plus additional time for further pH testing). The equipment needed is itemized. With the student script there is included a pH worksheet that can be used for recording the observations made and answering suggested questions relevant to observations made. (EB)

ED 096 121 SE 018 021
Stettler, Donald
Introduction to Classification of Living Things.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date [73]
Note—14p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, *Classification, Instruction, *Instructional Materials, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This monograph contains an autoinstructional packet developed for secondary school biology students. The instructions present a lesson on classification using slides and packets of pictures as the media for displaying the animals and plants to be classified. A brief historical account leads into the study of the modern classification system. No prerequisites are indicated nor are there any suggestions regarding time allotment, equipment or materials, or bibliographical information. (EB)

ED 096 127 SE 018 028
Henderson, Paula
Mitosis.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—7p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Biology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

Cytology is the subject that is dealt with in this autoinstructional program. The process to be understood by secondary school students who are taking biology is mitosis. The material is presented to be adequate for achievers at the middle level. Knowledge of the structure of the

DNA molecule and of the parts of the cell are considered as prerequisites for this lesson. Three behavioral objectives are suggested. Equipment and materials needed are itemized. Approximately 15 minutes is needed. A vocabulary sheet, a student script and a suggested method of evaluation are included in this packet. (EB)

ED 096 130 **SE 018 032**
Henderson, Paula
Energy Relationships.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—6p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Ecology, Energy, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with the study of energy relationships as they occur in the subject Ecology. It is recommended for study in grade 10 for middle level achievers. No prerequisites are listed. Behavioral objectives are suggested. The equipment needed to be used with the student script supplied is listed. Ten minutes is given as the suggested time needed. (EB)

ED 096 131 **SE 018 033**
Dillner, Harry
Parasites, Competition, and Predators.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, Environmental Education, Grade 10, Instruction, *Instructional Materials, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields), Zoology
Identifiers—*Del Mod System

This autoinstructional unit is used in conjunction with a biology course with emphasis on Man and Environment. No grade level is suggested nor are any prerequisites listed. One behavioral objective is given. Equipment necessary for the unit is listed. A student study guide, a teacher's guide and a script are included in the packet. A 30-minute time slot is suggested. (EB)

ED 096 132 **SE 018 034**
Derickson, Beatrice T.
The Beech Tree.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date [73]
Note—12p.; Marginal legibility on entire document
Available from—ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)
Document Not Available from EDRS.
Descriptors—*Autoinstructional Programs, Botany, *Elementary School Science, Instruction, *Instructional Materials, Junior High School Students, Science Education, Teacher Developed Materials, Trees, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional unit deals with the study of botany with emphasis on a specific tree. It is suggested for use with lower-middle level achievers in the intermediate grades. No prerequisites are listed. The behavioral objectives are given. The script presented is accompanied by an objective sheet, a test, test answers and a vocabulary sheet. (EB)

ED 096 133 **SE 018 035**
Darlington, Kent H.
What Are the Effects of Ecology?
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—9p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Biology, *Ecology, Instruction, *Instructional Materials, *Middle Schools, Science Education, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional packet deals with first-hand experiences in exploring wooded areas and some of the ecological problems that might occur therein. It is a learning experience directed toward middle school age students and no previous experience in this field of study is required. The behavioral objectives are listed along with a vocabulary list, a suggestion for an evaluation technique that could be used. Some extra student activities are included and a short bibliography is given. (EB)

ED 096 134 **SE 018 036**
Dillner, Harry
Succession - Change in Communities.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—11p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Autoinstructional Programs, *Community Change, *Ecology, *Environmental Education, Instruction, *Instructional Materials, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with the study of man and his environment. No prerequisite knowledge or experience is suggested. Behavioral objectives are suggested. Equipment needed is itemized and a 30-minute period of time is suggested. The script for the student includes a study guide sheet consisting of several questions to be answered relevant to the behavioral objectives. A short bibliography is included. (EB)

ED 096 135 **SE 018 037**
Sullivan, N. A.
An Imaginary Trip Through the Marsh.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Autoinstructional Programs, Biology, *Ecology, Instruction, *Instructional Materials, *Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional lesson deals with lessons in marine biology. A student will have experiences with both animal and plant life living in a salt water marsh environment. The student guide states the objectives to be attained and general directions for using the equipment and materials as well as a script. Approximately 30 minutes, including viewing time of the slides, is required. A list of vocabulary terms and a short bibliography are included on the teacher's guide. A student vocabulary sheet is presented. (EB)

ED 096 136 **SE 018 038**
Henderson, Paula
Photosynthesis Part I.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—9p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, Instruction, *Instructional Materials, *Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with the biological concept of the food making process in plants. No information is listed suggesting previous courses in science or level of achievement required. Behavioral objectives are listed. The script and an accompanying student quiz sheet, as well as a list of materials and equipment needed, are presented. Approximately 15 minutes is required for this lesson. (EB)

ED 096 137 **SE 018 039**
Henderson, Paula
Water Pollution.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—11p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Autoinstructional Programs, Biology, Instruction, *Instructional Materials, Low Ability Students, Pollution, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields), *Water Pollution Control
Identifiers—*Del Mod System

This autoinstructional program deals with the ecology of a stream. It is suggested as a learning experience for low achievers in a high school biology program. Two behavioral objectives are suggested and the equipment needed is listed. The script has an accompanying worksheet for the student and a set of related questions to be answered. (EB)

ED 096 138 **SE 018 040**
Henderson, Paula Dillner, Harry
Man and His Environment (Environmental Workshop).
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—17p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Curriculum Guides, *Ecology, Environmental Education, Instruction, *Instructional Materials, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This monograph presents what was originally designed as a nine-week course in population ecology. The course guide is intended to provide the teacher and student with a basic framework for an environmental workshop. Learning objectives are not listed, based on the intent that they be developed as teachers and students interact during the workshop. The curriculum guide does include: (1) a philosophy, (2) goals, (3) educational and instructional objectives, (4) instructional activities, (5) learning resources, (6) reading lists, (7) guide for field studies, and (8) a course evaluation form. Emphasis is directed toward population ecology, organization and dynamics of communities, energy flow and pollution problems. (EB)

ED 096 139 **SE 018 041**
Henderson, Paula
Trash.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—10p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Biology, Environmental Education, *Environmental Influences, Instruction, *Instructional Materials, Low Ability Students, *Pollution, Science Education, *Secondary School Science, Teacher Developed Materials

Identifiers—*Del Mod System

This autoinstructional program deals with the study of a common environmental factor-disposition of useless materials. It is a learning activity for low achievers in high school biology classes, requiring only 15 minutes of study time. Three behavioral objectives are listed, and seven references are cited in the bibliography. The student script includes a worksheet that can be completed during or following the use of the script. (EB)

ED 096 140 SE 018 042

Dillner, Harry

Testing Water for Bacterial Pollution.

Delaware State Dept of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—13p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Biology, *Ecology, Instruction, Instructional Materials, *Microbiology, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields), *Water Pollution Control

Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of water pollution control. It is a learning activity directed toward high school students of biology and/or ecology. A general knowledge of microbiology techniques is regarded as a prerequisite for the lesson. Behavioral objectives are given. Emphasis is placed on use of techniques and materials to test for and identify specific bacteria. One hour is considered as the minimum time needed for the activity. The instructional packet includes a list of equipment needed, the type of space required, and a bibliography. A calculation chart, a cleanup procedure sheet, and a student evaluation form are included with the student script. (EB)

ED 096 141 SE 018 043

Johnstone, W. T., Jr.

Cycles.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—9p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *Biology, Grade 10, Instruction, *Instructional Materials, Physical Sciences, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional unit deals with both biological and physical science phenomena. it is directed toward students in biology classes at grade 10 level. No prerequisites are suggested. The behavioral objectives are cited. Equipment and materials needed are listed. The student guide includes the objectives and activities to be accomplished. A bibliography of two references is presented. (EB)

ED 096 142 SE 018 044

Dillner, Harry

U.S. Population Growth.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—8p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *Environmental Education, Instruction, *Instructional Materials, *Middle Schools, *Population Growth, Science Education, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of man and his environment. No previous experience or learning in this field is required. Emphasis is placed on analysis of population growth and the impact population growth and trends have on natural resource depletion. The behavioral objectives (five) are listed. The study guide for the student, which requires about 30 minutes of time, includes both script and worksheet. A bibliography of three references is given. (EB)

ED 096 143 SE 018 045

Dillner, Harry

Measuring Populations, Part 1.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—9p.; For Part 2, see SE 018 046

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *Environmental Education, Instruction, *Instructional Materials, *Population Growth, Population Trends, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional packet, Part 1 of a two-part sequence, contains activities related to environmental education. Emphasis is placed on techniques used to obtain data on population growth and trends. It is suggested that it be used with high school students who have had a general introduction to the study of populations and can define same. The behavioral objectives are listed, divided into general objectives (3) and specific (2). A worksheet for answers and mathematical computations is included with the script. A biobliography is also included in the packet. (EB)

ED 096 144 SE 018 046

Dillner, Harry

Measuring Populations, Part 2.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date [73]

Note—9p.; For Part 1, see SE 018 045

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *Environmental Education, Instruction, *Instructional Materials, *Population Growth, Population Trends, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional lesson dealing with the study of population growth is the second part of a two-part sequence. This is a learning activity for high school students who have completed Part I of "Measuring Populations" and are capable of using a microscope and of preparing slides to be observed. The behavioral objectives, both general and specific, are listed in the teacher's guide. The necessary equipment and materials are listed. A script, a sample evaluation sheet, and a bibliography are part of the instructional packet. (EB)

ED 096 145 SE 018 047

Henderson, Paula

Meiosis.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—10p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Biology, *Cytology, Instruction, *Instructional Materials, *Middle Schools, Science Education, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of cytology (or cells) with emphasis placed on cell reproduction. Knowledge of the structure of the DNA molecule and of the stages of mitotic cell division are considered prerequisites for this lesson. Approximately 15 minutes is the established time set for the activity. The behavioral objectives are listed and the equipment and materials required are itemized. A vocabulary guide and a self-quiz exercise are included with the student script. (EB)

ED 096 146 SE 018 048

Henderson, Paula

Monohybrid Cross.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—7p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Biology, *Genetics, Heredity, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of genetics. It is a learning activity for so-called middle achievers in grade 10 biology classes. Previous knowledge of the process of mitosis and meiosis are important requirements. Behavioral objectives are suggested. Approximately 20 minutes are needed to complete the instructional unit. The equipment and materials necessary with the script are itemized in the packet. (EB)

ED 096 147 SE 018 049

Johnstone, W. T., Jr.

Blood Typing--Technique.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—9p.

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, *Biology, *Genetics, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This instructional packet deals with the study of hematology. It is recommended for all high school students of biology. A general understanding of antigen-antibody reactions is necessary before attempting this learning activity. Behavioral objectives place emphasis on the techniques of and understanding of blood typing. The equipment and materials needed are listed, most of which must be prepared in advance. The student script, student guide (work sheets), and a sample evaluation are all included in the packet. (EB)

ED 096 148 SE 018 050

Henderson, Paula

DNA Structure.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73
Note—9p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Biology, Cytology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials
Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of molecular biology. It is suggested as relevant to high school biology courses. No prerequisites are suggested. Two behavioral objectives are given leading to the learning of nucleotide bases, their parts, and the ways they pair as they do. The time suggested for this learning activity is about 12 minutes. Equipment necessary is listed. A work sheet to facilitate student evaluation accompanies the script. (EB)

ED 096 149 SE 018 051
Turkington, B. A.
Male Reproductive System.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—14p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Health Education, *Human Body, Human Development, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional lesson deals with the study of the human body with emphasis on the life process of reproduction. It is a learning activity included in high school biology or health education classes. The behavioral objectives are listed and the equipment and materials needed to help the student gain these objectives are also included in the packet. It is suggested that 20 minutes will be needed to complete the lesson. A complete vocabulary sheet is presented with the student script. (EB)

ED 096 150 SE 018 052
Hodge, N. J.
Female Reproductive System.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—16p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Health Education, *Human Body, Human Development, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional lesson can be used with health education and/or biology classes in a high school curriculum. It deals with the study of human development with emphasis on the female reproductive organs and cycles. The behavioral objectives are given, and the materials and equipment needed to gain these objectives are itemized. Fifteen minutes of time is considered enough time to have the students complete the lesson. The script is included in the packet as well as a vocabulary sheet and a work sheet for the student. A bibliography is given. (EB)

ED 097 215 SE 018 222
Life - Past, Present and Future. Environmental Education Curriculum. Revised.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jan 74
Note—137p.; Teacher Paper L, Page 5 omitted; Best copy available; Occassional marginal legibility
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—*Biological Sciences, *Curriculum Guides, Demography, Ecology, *Environmental Education, Instruction, Instructional Materials, Life Style, *Population Education, Science Education, *Secondary School Science
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This unit attempts to interrelate the traditional biological science studies such as food webs, population changes and ecological succession to form a coherent picture of our world today, the factors that created it and the forces that continue to change it. Designed for use in the secondary schools, it is built around nine films and has seven basic topics: (1) Prehistoric life, the sequence and causes of the changing plant and animal communities; (2) Causes of climatic patterns; (3) Roles of participants in natural communities; (4) Biomes throughout North America; (5) Population; (6) Adaptations; and (7) Man's role in the natural environment. Teaching aid materials include behavioral objectives of the unit, a suggested time line, suggested methodologies, an annotated list of the nine films and suggested evaluative instruments. (MLB)

ED 100 662 88 SE 018 353
Biology, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—119p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Biology, Conservation Education, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Outdoor Education, *Science Education, *Secondary Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This biology guide, for use at the secondary level, is one of a series of guides, K-12, which were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design, containing a series of episodes (minilessons) that emphasize experimentation and discussion relating to environmental problems making science more relevant to the student. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or in different subject areas. This guide focuses on aspects such as photosynthesis, the food chain, and the watercycle. The 12 concepts are covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 100 667 88 SE 018 358
Life Science, Environmental Education Guide.
Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C., Wisconsin State Dept. of Education, Madison.
Pub Date [74]
Note—40p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—*Biological Sciences, Conservation Education, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Outdoor Education, *Science Education, *Secondary Education, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This life science guide is one of a series of guides, K-12, that were developed by teachers to help introduce environmental education into the total curriculum. The materials contained in the guide are supplementary, and designed to aid the science teacher in providing the kinds of experiences needed by students to gain an understanding of the environmental life processes. The guide contains a series of episodes (minilessons) that are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or subject areas. This guide focuses on aspects such as succession, ecosystems, and the food chain. Most of the 12 concepts are covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 100 684 SE 018 581
Coble, Charles R. Bland, Charles E.
Open-Ended Experimentation with the Fungus Pilobolus.
Pub Date 6 Apr 74
Note—6p.; Paper presented to the Regional Meeting of the North Carolina Science Teachers Association (St. Andrews College, Lauringburg, North Carolina, April 1974)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Biology, Botany, *Instructional Materials, *Laboratory Experiments, *Science Activities, *Science Education, Secondary School Science
Identifiers—*Mycology, Pilobolus

This paper describes open-ended experimentation with the fungus Pilobolus for laboratory work by high school students. The fungus structure and reproduction is described and sources of the fungus are suggested. Four areas for investigation are suggested: the effect of a diffuse light source, the effect of a point light source, the effect of light intensity, and the effect of different colors of light. Questions are also raised that additional experiments could be designed to explore. Also inlcuded is a list of publications concerning additional information on Pilobolus. (BR)

ED 100 777 95 SO 008 066
Reinard, William
Investigating Environmental Problems in a High School Biology Course for Grades 11-12.
Western Washington State Coll., Bellingham. Huxley Coll. of Environmental Studies
Spons Agency—National Center for Educational Research and Development (DHEW/OE), Washington, D.C.
Bureau No—BR-0-0848
Pub Date Dec 71
Grant—OEG-0-70-5039
Note—18p.; This document is part of the ongoing Sedro-Woolley Project (see ED 061 118 and 066 363); Pages 15 through 19 from the appendix have been removed to conform with copyright laws
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Biology, *Ecology, *Environmental Education, Environmental Research, *Interdisciplinary Approach, Models, Problem Solving, Secondary Education, Social Sciences, Social Studies, *Values
Identifiers—*Sedro Woolley Project

A second-year biology class at Sedro-Woolley High School is part of an interdisciplinary program designed to develop a heightened awareness of environmental problems. A model for such a course is explained and evaluated. Students' awareness of values increases through the use of problem-solving techniques, audiovisual aids, articles and books, and school-community projects in pursuing environmental concerns. These learned values rest on sociological, psychological, emotional, spiritual, and philosophical bases that interrelate with the values of scientific and technological developments. Through this, the student becomes aware that an environmental situation is the result of the relationship of man to his world. In evaluating results of the study, two thoughts come to mind for the teacher involved in an integrated academic program (1) in keeping with the idea that all education is environmental education, one would conclude that ideas relative to environmental concerns should be interwoven into the total fabric of the educational process, and (2) a real challenge is presented to the teacher in preparing students to recognize our society's cultural attitudes and value systems and to provide a chance for the student to become adept at evaluating these attitudes and values, his own as well as those of society, and at developing his own perceptions. (Author/JR)

ED 101 013 95 TM 004 248
Samph, Thomas Sayles, Felton
A Validation Study of RACE (Racial Attitude and Cultural Expression Test). Final Report.
Syracuse Univ., N.Y. School of Education.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Bureau No—BR-3-1639
Pub Date May 74
Grant—NE-G-00-3-0052
Note—87p.; For a related document, see TM 004 249
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Attitude Tests, Caucasian Students, Elementary Education, *Elementary School Students, Hypothesis Testing, Literature Reviews, Negro Youth, *Racial Attitudes, *Test Reliability, Tests of Significance, *Test Validity
Identifiers—*Racial Attitude and Cultural Expression Test

The intent of this investigation was to perform a validation study to determine whether RACE (Racial Attitude and Cultural Expression test) differentiates between primary grade students identified as having negative and positive attitudes. Students were categorized by a combination of administrator, teacher and clinical assessment into a negative or positive racial attitude group. These students were administered RACE to determine whether it could discriminate and whether an acceptable level of reliability was present. The variables of Linear Distance, Student Inclusion, Identification, and Power demonstrated acceptable reliability and discrimination levels. Even though selected variables discriminated, overall, the instrument failed to discriminate positive and negative student attitude groups. (Author)

ED 101 942 95 SE 018 115
[East Syracuse-Minoa Schools Environmental Education Materials, Middle School Package, Grade 7—Science.]
East Syracuse - Minoa Central Schools, East Syracuse, N.Y.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Pub Date [73]
Grant—OEG-0-71-4621
Note—336p.; Best copy available; occasional marginal legibility
EDRS Price MF-$0.76 HC-$17.13 PLUS POSTAGE
Descriptors—Botany, Conservation Education, *Curriculum Guides, *Ecology, *Environmental Education, Grade 7, Instructional Materials, Interdisciplinary Approach, Natural Resources, Outdoor Education, Science Activities, *Science Education, *Secondary School Science, Teaching Guides, Units of Study (Subject Fields), Zoology

These five environmental education science units are designed for use in the seventh grade. Skills such as note taking, organizing information, critical thinking, analysis of data, and scientific skills, and the correlation between skills and content area are emphasized throughout the units to develop in the student a greater understanding of his role in the environment, and the interdependencies between all living things and the environment. Each unit is developed around long range objectives which reflect and reinforce the objectives of the other four units. Objectives, activities and strategies, materials, and evaluation techniques are identified for each of the five science units. The first unit is basically an introduction to the series, emphasizing skills as well as introducing the student to his environment with an ecology project. Unit 2 discusses the process of photosynthesis and the importance of green plants. Unit 3 centers on animals and their relation to others of the same and different species. Unit 4 stresses the importance of interactions between plants and animals. Human ecology is discussed in Unit 5 in light of pollution and possible solutions. Appendixes and supplementary materials are included. (Author/TK)

ED 106 074 SE 018 255
Halsey, Clifton
Wildlife Habitat Improvement Guide for Minnesota Youth.
Minnesota Univ., St. Paul. Agricultural Extension Service.
Spons Agency—Department of Agriculture, Washington, D.C.
Report No—4-H-Bull-4
Pub Date 73
Note—37p.; Photographs related to the text may not reproduce clearly
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—*Conservation Education, Ecology, Elementary Secondary Education, Environment, *Environmental Education, *Natural Resources, *Outdoor Education, Science Education, *Wildlife Management, Zoology

This publication outlines projects to increase wildlife, primarily fowl and deer, and to help rural youth better understand wildlife requirements. The publication outlines six basic steps that are involved in initiating a wildlife project. These are: (1) Determine the types of wild animals for which the land is best suited; (2) Study the life requirements of species selected for management; (3) Prepare a habitat map; (4) Make a general inventory of that area's game species; (5) Determine which of the selected species' life requirements are lacking; (6) Design and implement projects that will improve the wildlife habitat and increase the number of wildlife. The publication devotes a section to each step: the sections include photographs, maps, diagrams, tables, background information, and suggested resource materials. Such topics as winter cover, winter food, nesting cover, wetland development projects, and area types are included. The final section provides a closer look at such projects as pheasant projects, sharptailed grouse-prairie chicken projects, water fowl projects, and deer and ruffed grouse projects. A recommended reading list is included. (TK)

ED 106 088 88 SE 018 507
Marine Ecology Research Resource Units Grades 7-9. Draft.
Contra Costa County Dept. of Education, Pleasant Hill, Calif.
Pub Date Sep 74
Note—178p.
EDRS Price MF-$0.76 HC-$9.51 PLUS POSTAGE
Descriptors—Earth Science, *Ecology, Environmental Education, *Learning Activities, *Oceanology, Outdoor Education, *Science Education, *Secondary Education, Teacher Developed Materials
Identifiers—California, Elementary Secondary Education Act Title III, ESEA Title III

Project Marine Ecology Research (MER) is an ecological unit designed to involve secondary students in the study of the marine biome. The teachers are also involved with MER through inservice participation and materials preparation. The unit is designed to be incorporated within the existing science curriculum. Specifically, the activities concern the study of the San Francisco Bay area--its geology, geography, climate and weather, wave and tide action, and currents. Each of the four activity sections are arranged similarly. The Introduction includes background information for the teacher and a list of educational objectives. The appendix contains the activities as well as charts, maps, statistics, and other pertinent information. Each section ends with a bibliography. (MA)

ED 106 089 95 SE 018 508
Castellani, Marylynn L., Ed.
Guide to Marine Ecology Research . . . a Curriculum for Secondary Students.
Contra Costa County Superintendent of Schools, Pleasant Hill, Calif.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Sep 74
Note—150p.; Contains numerous maps and drawings unsuitable for reproduction
Available from—Director, Project MER, Contra Costa County Superintendent of Schools Office, 75 Santa Barbara Road, Pleasant Hill, California 94523; ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)
Document Not Available from EDRS.
Descriptors—Earth Science, *Ecology, Environmental Education, Laboratory Manuals, *Learning Activities, *Oceanology, Outdoor Education, *Science Education, *Secondary Education
Identifiers—*California, Elementary Secondary Education Act Title III, ESEA Title III

Project Marine Ecology Research (MER) is an ecological curriculum designed to involve secondary students in the study of the marine biome. The background material and learning activities concern the study of the San Francisco Bay Area. The guide is divided into two major parts. In the first part, a history of the Bay Area is given. It includes the nature of the region, major changes, and important aquatic species. The bay-delta-estuarine ecosystem is discussed in detail. Particular attention is given to the life histories of the king salmon and the striped bass. The relationship between organisms and water quality is also treated. This section ends with a discussion of the future of this area. Part two contains the laboratory investigations. These activities complement the earlier discussions and directly concern an analysis of the Bay Area. Topics include the study of a plankton population, the San Francisco watershed, and biological sampling of a mud flat. (MA)

ED 107 513 SE 019 190
Boeschen, John And Others
Exploring Your Sense of Smell. Science Study Aid No. 10.
Agricultural Research Service (DOA), Washington, D.C.
Pub Date Feb 75
Note—21p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 001-000-03393, $0.40)
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—*Instructional Materials, Interdisciplinary Approach, *Junior High Schools, *Learning Activities, Lesson Plans, *Science Education, *Secondary Education, Sensory Experience, Teacher Developed Materials
Identifiers—*Odors

This Science Study Aid (SSA), structured for grade levels 7-9, is based on work of the U.S. Department of Agriculture's Agricultural Research Service (ARS) conducted at the Western Regional Research Center in Berkeley, California. It is concerned with food aroma, its intensity and character, and olfactory threshold determinations. The SSA provides students with background information to help understand the importance of determining odor preferences and olfactory thresholds. There are three investigations for the student entitled: Fruit Flies and Bananas, Preference Testing, and Olfactory Threshold Determination. In the section entitled To the Teacher, suggestions are provided for each of the investigations to facilitate classroom use. Included are: Materials Lists, Directions for Preparing Solutions, and Suggested Readings and Films. (BT)

ED 108 874 SE 019 041
Hendren, Travis E. Bryant, C. Douglas
Suggestions and Procedures for Developing Teaching-Learning Stations. Revised.
North Carolina State Dept. of Public Instruction, Raleigh.
Pub Date Jul 74
Note—68p.; Listed as Appendix F of SE 019 043; For related documents see, SE 019 042 and

043
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—Conservation Education, *Educational Programs, Elementary Secondary Education, Environment, *Environmental Education, *Field Instruction, *Instructional Materials, Natural Resources, *Outdoor Education, Program Planning, Recreation, Sciences, Teaching Guides
Identifiers—Learning Stations, Teaching Stations

This booklet is a collection of outlines for various teaching-learning stations which were developed by 21 teachers during a three-week institute held in 1972 at Barnardsville, North Carolina. The purposes for such stations, which can be developed inexpensively by students and teachers on school property, are: (1) to create outdoor and environmental awareness, (2) to create outdoor recreation and environmental sensitivity, (3) to provide occupational exploration, and (4) to provide occupational training. Twenty-nine stations are included in the booklet. Each station outline includes: (1) title of the teaching-learning station; (2) description of the station; (3) rationale; (4) requirements for land, equipment, facilities, and time for development; (5) resources; and (6) Future Farmer of America and Supervised Occupational Experience uses. Stations such as a nature trail, soil profile, weather station, fish pond, and plant and insect display are included. Completing the booklet are various lists, including lists of related books, magazines and booklets, slide sources, film sources, and resource agencies. (TK)

ED 108 875 **SE 019 042**
Hendren, Travis E. Lenk, Alan
Suggestions and Procedures in Developing Nature Trails. Revised.
North Carolina State Dept. of Public Instruction, Raleigh.
Pub Date Sep 74
Note—34p.; Listed as Appendix E of SE 019 043; For related documents see, SE 019 041 and 043
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—Art, Conservation Education, *Educational Programs, Elementary Secondary Education, Environment, *Field Instruction, Instructional Materials, *Interdisciplinary Approach, Language Arts, Natural Resources, Outdoor Education, Sciences, Social Studies, *Teaching Guides, *Trails
Identifiers—*North Carolina

Though public nature trails have been in use since the late 1800's, their use on school grounds for educational purposes is a relatively new concept. The nature trail is an important tool for teaching environmental awareness and appreciation. It provides experiences for observing nature firsthand with all senses employed. It is a resource that is available to the entire school and is applicable to all curriculum areas. The purpose of this booklet is to provide information for teachers, administrators and students on how they may plan and develop a nature trail at their school. Locating the trail, trail construction, trail interpretation, and maintenance are covered in section 1. Section 2 focuses on art, science-math, language arts, and social studies activities which could evolve from classroom use of the nature trail. Section 3 provides ideas and examples of trail topics such as a marsh trail, historical trail, wood trail, and geology trail. Examples of outdoor demonstrations and charts are also included in this section. Section 4 is a list of environmental education sources and aids including associations, books, magazines, films, and resource people. The booklet concludes with a list of outstanding nature trails located in North Carolina. (Author/TK)

ED 108 890 **SE 019 068**
Brown, Robert T., Ed. Clark, Barbara G., Ed.
Horse Manure and Other Fun Projects. Field Studies and Laboratory Experiences in Environmental Biology - A Book of Experimental Ideas for Secondary School Biology Teachers.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—140p.; The product of a conference held on Isle Royale National Park, June 1971. Best copy available; occassional marginal legibility
EDRS Price MF-$0.76 HC-$6.97 PLUS POSTAGE
Descriptors—*Biological Sciences, Biology, Conservation Education, *Environmental Education, *Instructional Materials, Interdisciplinary Approach, Natural Resources, Outdoor Education, *Science Education, Secondary Education, *Teaching Guides

This guide contains a collection of laboratory and field inquiries designed to promote ecological awareness, sensitivity, and understanding. The activities compiled by 28 teachers are for use in teaching biology at the secondary level. They are presented in a "recipe" form to make it possible for teachers without prior experience or training to use the activities with ease and confidence. The experiments are generally open-ended, leaving the teacher and students with extensions for further activities. Nine chapters are included in the guide: Planning Outdoor Field Experiences; Field Studies, Physical Factors; Field Studies, Plants; Field Studies, Animals; Field Studies: Succession; Field Studies, Water Organisms; Laboratory Studies; Human Ecology, Pollution, and Population; and Permanent Outdoor Facilities Development and Use. Each chapter contains a number of activities. The activities contain, when appropriate: the purpose, procedures, materials, observations, suggestions and discussion topics, and conclusions. A reference section including books, programs, and resource people completes the guide. (TK)

ED 117 567 **CE 006 284**
Career Education Resource Guide for Biology. Working Draft.
Louisiana State Dept. of Education, Baton Rouge.
Report No—VT-102-463
Pub Date 74
Note—41p.; For related documents, see CE 006 282-291
EDRS Price MF-$0.83 HC-$2.06 Plus Postage
Descriptors—*Biology, *Career Education, Career Exploration, Career Opportunities, *Learning Activities, *Occupational Information, *Resource Guides, Science Curriculum, Secondary Education
Identifiers—Louisiana

The resource guide integrates learning activities in biological science with an exploration of careers in biology or related fields. The materials are divided into seven units: tools of the scientist, basis for life, diversity (protists, plants, animals), structure and function, continuity (reproduction, development, and genetics), evolution, and ecological concepts. Each unit is discussed by subdividing the information or ideas into categories of: (1) content outline, (2) suggested curriculum activities, and (3) career information (occupational clusters, career activities and careers related to biology). Career activities may or may not relate to the specific subject matter with which it appears. The content outline suggests a possible sequence for covering materials while the activity column suggest exercises that could effectively be used with each unit or sub unit. A list of State adopted biology textbooks (categorized by learning level) and a career bibliography for grades 10-12 conclude the document. (Author/NJ)

ED 123 059 **SE 020 407**
Baker, Thomas M. Reiher, John F.
Equinox. A Model for the Natural Science Education Curriculum for the Ninth Through Twelfth Grades in the Delaware Schools.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date Jan 75
Grant—NSF-GW-6703
Note—46p.; For related documents, see SE 019 380 and SE 020 404-406; Best Copy Available; Colored Paper
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 (Free while supply lasts)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage
Descriptors—Biological Sciences, *Curriculum Guides, *Natural Sciences, Physical Sciences, *Science Education, *Secondary Education, *Secondary School Science, State Curriculum Guides, State Programs
Identifiers—*Delaware, Del Mod System, National Science Foundation, NSF

This publication represents a model for the Natural Science Education Curriculum for grades nine through twelve in Delaware's schools. This guide is meant to serve as a minimal standard for natural science education, but at the same time strives for maximum output of the natural science program. The guide is based on the processes of science education as well as the concepts and attitudes of the biological, physical, and earth sciences. Four basic goals have been identified and a set of terminal objectives has been established for each goal. These goals and objectives provide the framework for the development of district, local, building, or classroom programs. The guide lists eleven major processes of science education, suggests ability levels, and identifies the six major concepts to be included in the natural science curriculum. The minimal objectives for the senior high school have been indicated. These objectives have been broken down by course area, i.e., earth science, physical science, biology, chemistry, and physics. The final section of this guide includes course requirements for science at the high school level, requirements for teaching science, and current educational philosophies that relate to the natural science educational program. (BT)

ED 128 294 **SP 010 366**
Howard, Mary Kay Franks, Betty Barclay
The Biological Revolution: Examining Values Through the Futures Perspective.
National Education Association, Washington, D.C.
Pub Date 76
Note—33p.
Available from—National Education Association, 1201 Sixteenth St., N.W., Washington, D.C. 20036 (Stock No. 0709-3-00, No price quoted)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—Artificial Intelligence, *Biological Sciences, Bionics, *Class Activities, Decision Making, *Futures (of Society), *Human Engineering, *Interdisciplinary Approach, Technological Advancement, *Values

The most value laden of futures issues are raised by contemporary biological research. Current biological research has reached the point where we must now ask such questions as: What should be the nature of the human in the future? Who should make these decisions? How should humans interact with the universe? The problems and possibilities of the biological revolution cannot be compartmentalized because they affect all areas of life. Teachers from social studies, biology, health, and humanities have found that these issues cannot be examined through the narrow perspective of only one discipline. Examining the biological revolution through the futures perspective enables students to take a multidisciplinary approach to tomorrow's critical issues today. This report describes a series of values questions which, combined with media, materials, and activities, can be used to form a unit to help students examine the biological revolution through the futures perspective. This unit can be added to existing courses, or portions of it can be inserted wherever teachers think it would be appropriate to involve students in values clarification activities. Because the approach is multidisciplinary, materials are included that can be used in biology, psychology, government, science fiction, humanities, and futures classes. (Author/MM)

ED 130 058 **08** **CE 008 321**
Quinn, Kathy, Comp.
Curriculum Guide and Bibliography: "Reducing Sex-Role Stereotyping through Career Education."
Bristol Career Education Program, Conn.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Grant—G00-75-02291
Note—47p.
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Bibliographies, Career Choice, *Career Education, Curriculum Guides, Discriminatory Attitudes (Social), *High School

Curriculum, *Learning Activities, Lesson Plans, Nondiscriminatory Education, Occupational Clusters Senior High Schools, Sex Discrimination, *Sex Role, *Sex Stereotypes, Social Attitudes

Lesson plans and bibliographies compiled in this booklet were created by participants in a series of in-service workshops conducted to heighten awareness of sex-role stereotyping and its relationship to career education. The curriculum guide presents 15 high school lesson plans (units). Each unit includes, in outline form, the headings of Cluster, Subject, Grade, Related To, Goal, Career Education Objectives, Procedure, Results, and Follow-Up. Lesson plans are developed for these subjects: Biology, clothing, community studies, distributive education, English, foods, guidance, mathematics, physical education, Spanish, special education, springmaking, typing, women in literature, and world history. Bibliographies of non-sex biased materials are compiled for business, career education, distributive education, English, foreign language, guidance, home economics, industrial arts, mathematics, physical education, science, special education, women in literature, and world history. (TA)

ED 130 116 CE 008 638

Occupational Orientation: Applied Biological and Agricultural Occupations. Experimental Curriculum Materials.

Illinois State Office of Education, Springfield.

Pub Date [75]

Note—178p.; For related documents see CE 008 635-639

EDRS Price MF-$0.83 HC-$10.03 Plus Postage.

Descriptors—Activity Learning, Agribusiness, Agricultural Machinery Occupations, *Agricultural Occupations, Agricultural Production, Attitude Tests, *Biological Sciences, *Career Exploration, *Conservation (Environment), Criterion Referenced Tests, Curriculum, Environment, Farm Mechanics (Occupation), Forestry Occupations, Horticulture, Instructional Materials, *Learning Activities, Lesson Plans, Natural Resources, *Occupational Clusters, Occupational Guidance, Performance Based Education, Secondary Education

Identifiers—Illinois

These experimental curriculum materials, from one of five clusters developed for the occupational orientation program in Illinois, include a series of learning activity packages (LAPs) designed to acquaint the student with the wide range of occupational choices available in the applied biological and agricultural occupations. The 30 LAPs, each with a different occupation focus are grouped under six categories: (1) Applied Biological and Agricultural Occupations, (2) Agricultural Mechanics, (3) Agricultural Products, Supplies, Sales, and Services, (4) Natural Resources, Forestry, and Environmental Control, (5) Ornamental Horticulture, and (6) Production Agriculture. Each LAP identifies the category, the focus, the activity, and the objective. It lists the equipment, supplies, and forms needed, states the rationale, and describes the suggested procedure and alternate activities. The activities are designed to give students the opportunity to research, observe, and gain hands-on-experience in representative jobs within the career field. This document contains the Student Awareness/Attitude Inventory, and guidelines for developing pre-post assessment tests. Eleven student forms, 21 references, and 26 addresses for obtaining resources are appended. (HD)

ED 130 901 SE 021 643

Cook, Paul

Guess Who's Been Here for Dinner? [Aids to Individualize the Teaching of Science, Mini-Course Units for Grades 7, 8, and 9.]

Frederick County Board of Education, Md.

Pub Date 73

Note—13p.; For related Mini-Course Units, see SE 021 624-656

Available from—Frederick County Board of Education, 115 East Church St., Frederick, MD 21701 (no price quoted)

EDRS Price MF-$0.83 HC-$1.67 Plus Postage.

Descriptors—*Biology, Individualized Instruction, Instructional Materials, Junior High School Students, *Microbiology, *Science Education, Science Materials, Secondary Education, *Secondary School Science

Identifiers—Maryland (Frederick County), Minicourses, *Parasitology

This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to 7th, 8th, and 9th grade science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet introduces the student to an investigation of parasites in earthworms. The estimated time for completing the activities in this module is two days. (SL)

ED 130 903 SE 021 645

Sheffield, Sharon

Let's Look At You - The Human Organism. [Aids to Individualize the Teaching of Science, Mini-Course Units for Grades 7, 8, and 9.]

Frederick County Board of Education, Md.

Pub Date 73

Note—40p.; For related Mini-Course Units, see SE 021 624-656; Contains occasional light type

Available from—Frederick County Board of Education, 115 East Church St., Frederick, MD 21701 (no price quoted)

EDRS Price MF-$0.83 HC-$2.06 Plus Postage.

Descriptors—*Biology, *Human Body, Individualized Instruction, Instructional Materials, Junior High School Students, Process Education, *Science Education, Science Materials, Secondary Education, *Secondary School Science

Identifiers—Maryland (Frederick County), Minicourses

This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to 7th, 8th, and 9th grade science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet introduces the pupil to the study of the human body, body systems, and their functions. The estimated time for completing the activities in this module is seven weeks. (SL)

ED 141 152 SE 022 674

Observing Starfish—The Water Vascular System. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 224. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—32p.; For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$2.06 Plus Postage.

Descriptors—Biology, *Instructional Materials, *Marine Biology, *Oceanology, Secondary Education, *Secondary School Science, *Teaching Guides, Units of Study

Identifiers—Project COAST, *Starfish

This unit is designed for students in secondary school science classes. Emphasized are various aspects of the anatomy and behavior of the starfish. Included are teacher background materials, lists of needed materials, suggested activities, evaluation materials, transparency masters, and selected references. (RH)

ED 141 153 SE 022 675

The Rocky Shore. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 225. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—37p., For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$2.06 Plus Postage.

Descriptors—Biology, Earth Science, *Ecology, *Instructional Materials, *Marine Biology, *Oceanology, Secondary Education, *Secondary School Science, Teaching Guides

Identifiers—Coastal Zones, Project COAST

This unit is designed to be used by students in biology classes in secondary schools. Emphasized in the unit are coastal life zones, plants and animals that live in these areas, and factors influencing the lives of the organisms. Included in the unit are evaluation materials, instructional objectives, student background information, masters for overhead transparencies, suggested field trip plan and worksheets, a list of supplementary materials, and a selected bibliography. (RH)

ED 141 154 SE 022 676

A Comparative Study of Clam and Squid. Biting Flies of the Coastal Region. Diatoms: Nature's Aquatic Gems. Learning Experiences for Coastal and Oceanic Awareness Studies, Nos. 227, 231, 232. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—79p.; For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$4.67 Plus Postage.

Descriptors—Biology, *Instructional Materials, *Marine Biology, *Microbiology, *Oceanology, Secondary Grades, *Secondary School Science, *Teaching Guides, Units of Study

Identifiers—Clams, Diatoms, Flies, Project COAST

Included are three units related to coastal and oceanic awareness. The units are: (1) A Comparative Study of Clam and Squid, (2) Biting Flies of the Coastal Region, and (3) Diatoms: Nature's Aquatic Gems. All three units were designed for secondary school students. Each unit contains teacher background materials, student activity materials, evaluation materials, transparency masters, and selected references. (RH)

ED 141 158 SE 022 680

Pesticides and the Marine Environment. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 237. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—20p.; For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$1.67 Plus Postage.

Descriptors—*Environment, *Instructional Materials, *Marine Biology, *Oceanology, *Pesticides, Pollution, Secondary Grades, *Secondary School Science, Teaching Guides, Units of Study

Identifiers—Project COAST

This document, for secondary school students, is designed to provide an introduction to the effects of pesticides in organisms and the environment. Included are background materials for the teacher, charts and graphs of the effect of chemicals on organisms, questions for discussion and study, and references. (RH)

ED 141 160 SE 022 682

Measuring Dissolved Oxygen Quantitatively. Collecting and Cultivating Marine Bacteria. To Recognize, Record, and Analyze Characteristics of a Sandy Beach Environment. Quantitative and Qualitative Analysis of Phosphate in Water. Learning Experiences for Coastal and Oceanic Awareness Studies, Nos. 307, 309, 310, 313. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—71p.; For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—Biological Sciences, Earth Science, *Instructional Materials, *Marine Biology, *Oceanology, *Physical Sciences, Secondary Grades, *Secondary School Science, Teaching Guides, Units of Study

Identifiers—Bacteria, Beaches, Project COAST,

Water Analysis

Included are four activity units: (1) Measuring Dissolved Oxygen Quantitatively, (2) Collecting nd Cultivating Marine Bacteria, (3) To Recognize, Record, and Analyze Characteristics of a Sandy Beach Environment, and (4) Quantitative and Qualitative Analysis of Phosphate in Water. All the activities are designed to be used by secondary school students. Each activity includes student instructions, lists of materials needed, selected references, and supplementary activities. (RH)

ED 141 175 SE 022 700

Marine and Environmental Studies Field Manual.

Cranston School Dept., R.I.; Warwick School Dept., R.I.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Sep 73

Note—148p.; Page 77 missing from document; Best Copy Available

EDRS Price MF-$0.83 HC-$7.35 Plus Postage.

Descriptors—Animal Science, *Biological Sciences, Earth Science, Geology, *Instructional Materials, *Oceanology, Physical Sciences, Plant Science, Secondary Education, *Secondary School Science, *Units of Study

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Tides

This laboratory manual was developed for a field-oriented high school oceanology program. The organization of the units includes a selection of supplementary activities to allow students to explore ocean studies in more depth. Included are 19 units. The units include biological oceanography, physical oceanography, and some social science topics. A suggested sequence of activities is provided. (RH)

ED 162 915 SE 025 489

Lee, Richard S.

Construction and Maintenance of Classroom Aquaria. Marine Science Curriculum Aid No. 2.

Alaska Univ., Anchorage.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Report No.—SGR-76-13

Pub Date—[76]

Grant—NOAA-04-6-158-44039

Note—21p.

EDRS Price MF-$0.83 HC-$1.67 Plus Postage.

Descriptors—Biology, Chemistry, *Ecology, Environmental Education, *Environmental Influences, *Marine Biology, *Natural Sciences, *Science Education, *Water Resources

Identifiers—Sea Grant

This manual introduces teachers to the biological systems at work in a marine aquarium. It provides guidance in selection of the tanks, specifically discussing the effect of capacity on the well-being of the occupants. It guides the teacher in setting up aeration, filtering, lighting, and temperature control for the aquarium. It also advises on collection or treatment of water sources for the salt water aquarium. Instructions on the construction of homemade aquarium tanks are also provided. The selection of aquarium species is somewhat specific to those collectable in the coastal waters of Alaska. A glossary of terms is provided. (RE)

ED 174 473 SE 028 545

Bury, Don And Others

Oakland County Science Safety Series: Reference Guide for Biology.

Oakland County Schools, Pontiac, Mich.

Pub Date—77

Note—122p.; For related documents, see SE 028 544-547; Not available in hard copy due to copyright restrictions; Contains occasional colored pages which may not reproduce well ; Guide prepared by the Division of Instruction

Available from—Oakland Schools, Division of Instruction, 2100 Pontiac Lake Road, Pontiac, Michigan 48054 ($8.50 complete set; $2.50 ea.)

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Accident Prevention, *Biology, Laboratory Procedures, Laboratory Safety, *Safety, Safety Equipment, *School Safety, *Science Education, *Science Instruction, Secondary Education

This reference guide is designed to organize and suggest acceptable practices and procedures for dealing with safety in the area of biology instruction. It is intended as a reference for teachers, administrators, and other school staff in planning for science activities and in making daily safety decisions. Discussions deal with responsibility for safety, microbes, use of plant materials, use of animals, laboratory activities with humans, safety glasses, use of laboratory equipment and supplies, field trips, high risk experiments, special activities, emergencies, and recommendations. Numerous appendices deal with specialized considerations. (RE)

ED 175 730 SE 028 813

Morrison, James W., Ed. Hall, James A., Ed.

Terrestrial Ecology Guide.

Manchester Board of Education, N.H.; Saint Anselm's Coll., Manchester, N.H.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Pub Date—75

Grant—OEG-0-74-7345

Note—159p.; Photographs will not reproduce

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC07 Plus Postage.

Descriptors—*Biology, Botany, Class Activities, *Ecology, Environment, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Natural Resources, *Outdoor Education, Pollution, Science Education, *Secondary Education, *Zoology

This collection of study units focuses on the study of the ecology of land habitats. Considered are such topics as map reading, field techniques, forest ecosystem, birds, insects, small mammals, soils, plant ecology, preparation of terrariums, air pollution, photography, and essentials of an environmental studies program. Each unit contains instructions and materials lists necessary to implement the lessons contained in the unit. (RE)

ED 180 812 SE 029 541

Larsen, Bud Swartz, Linda

Ecology Enrichment, Grades 7-8.

Rocky River Public Schools, Ohio.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.

Pub Date—[77]

Note—120p.; For related document, see SE 029 540

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC05 Plus Postage.

Descriptors—*Biology, Conservation Education, Ecology, Environment, *Environmental Education, Field Trips, Junior High School Students, Natural Resources, *Outdoor Education, *Science Activities, *Science Education, Secondary Education

The curriculum materials in this manual are designed to support life science programs at levels seven and eight, and nine and ten, when appropriate. Field activities are focused upon and can be completed with the supervision of teachers, an older student, or an adult volunteer. Each activity contains background information, data pages, and/or discussion questions. The manual is divided into two sections: (1) investigations of the aquatic environment, and (2) the terrestrial environment. (Author/RE)

ED 180 813 SE 029 542

Long, David C. Powell, Nancy A.

Field Ecology, Grades 10-12.

Rocky River Public Schools, Ohio.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.

Pub Date—[77]

Note—90p.; Contains occasional light and broken type

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC04 Plus Postage.

Descriptors—Biology, Conservation (Environment), *Conservation Education, Earth Science, *Ecology, Environment, *Environmental Education, Field Trips, Natural Resources, *Outdoor Education, Pollution, Science Activities, *Science Education, Secondary Education, Teaching Guides, Water Pollution Control, Water Resources

Presented are activities which provide a program of first-hand experiences in field ecology for groups of three to five students under the leadership of a teacher or adult volunteer. Concentration is centered upon study of the effects of environment on living plants and animals and the interdependence of members of ecosystems. Each investigation includes background discussion, objectives, a list of needed materials, procedure, evaluation, recommendations for further investigation, and references. The sequence of investigations is designed for completion in a one-semester program. (RE)

ED 182 172 SE 029 959

Canipe, Stephen L.

Sickle Cell Unit.

Pub Date—79

Note—16p.; Contains occasional light and broken type

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC01 Plus Postage.

Descriptors—*Anemia, *Biology, Diseases, *Genetics, Instructional Materials, Science Education, *Science Units, *Secondary Education, Secondary School Science, Units of Study

Included in this high school biology unit on sickle cell anemia are the following materials: a synopsis of the history of the discovery and the genetic qualities of the disease; electrophoresis diagrams comparing normal, homozygous and heterozygous conditions of the disease; and biochemical characteristics and population genetics of the disease. A list of filmstrips, pamphlets and books to be used as reference materials is given. Also appended are genetics problems and overhead projection materials mapping areas of the world in which sickle cell anemia and malaria are prevalent. (CS)

ED 188 870 SE 031 000

Introducing the B I P (Biomedical Instrumentation Package). Many Important Electronic Functions in One Instrument.

Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date—76

Note—19p.; Contains occasional light and broken type.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC01 Plus Postage.

Descriptors—*Biological Sciences, *Health Education, *Interdisciplinary Approach, Learning Modules, Physical Sciences, *Science Activities, Science Education, *Science Equipment, Secondary Education, Secondary School Science

Identifiers—*Biomedical Interdisciplinary Curriculum Project

Described are the use and purposes of the Biomedical Instrumentation Package (BIP) in science classrooms. Science activities are suggested and equipment use is described. A sample laboratory activity, which includes materials, procedure, and discussion, is provided. (SA)

ED 188 927 SE 031 461

Biomedical Interdisciplinary Curriculum Project: Implementation Manual for High School Personnel.

Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date—76

Note—21p.; For related documents, see SE 031 462-471, ED 174 409-430, and ED 174 446-452. Contains occasional light and broken type

Pub Type— Guides - Non-Classroom (055)

EDRS Price - MF01/PC01 Plus Postage.

Descriptors—*Allied Health Occupations Education, Career Education, Health Education, *Integrated Curriculum, Mathematics Curriculum, Program Descriptions, *Program Implementation, *School Personnel, Science Course Improvement Projects, Science Curriculum, Science Education, *Secondary Education, Social Sciences

Identifiers—*Biomedical Interdisciplinary Curriculum Project

The Biomedical Interdisciplinary Curriculum Project (BICP) is a two-year interdisciplinary precollege curriculum designed to prepare high school students for entry into college and vocational programs leading to a career in the health field. Composed of three separate yet interrelated courses with interdisciplinary relationships between mathematics, science and social science, the curriculum package is designed with an emphasis on science, a great part of which is health content, which has been selectively integrated into the mathematics and social science courses. This manual is designed to assist high school personnel in implementing the BICP. It presents an overview of BICP, providing the rationale, objectives, format, and content of the curriculum package. Tables list unit titles and content for the courses of Biomedical Mathematics, Biomedical Science, and Biomedical Social Science. The Biomedical Instrument Package (BIP), Biomedical Practicum, and guidelines for the biomedical teaching team, teacher, student, and administration, are generally described. Curriculum and budget approval, implementation costs, course scheduling, and preservice and inservice training are also discussed. (CS)

ED 188 938 SE 031 462
Biomedical Mathematics, Unit II: Propagation of Error, Vectors and Linear Programming. Student Text. Revised Version, 1975.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—75
Note—285p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452. Contains occasional light and broken type.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC12 Plus Postage.
Descriptors—*Allied Health Occupations Education, Career Education, *Instructional Materials, *Integrated Curriculum, Linear Programing, *Mathematics Curriculum, Science Course Improvement Projects, Science Education, *Secondary Education
Identifiers—*Biomedical Interdisciplinary Curriculum Project

This student text presents instructional materials for a unit of mathematics within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on biomedical applications in the mathematics areas of propagation of error, vectors, and linear programing. Reading materials, graphs, illustrations, and problems accompany each lesson. (CS)

ED 188 939 SE 031 463
Biomedical Mathematics, Unit II: Propagation of Error, Vectors and Linear Programming. Instructor's Manual. Revised Version, 1975.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—75
Note—118p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452. Contains occasional light and broken type.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Allied Health Occupations Education, Career Education, *Integrated Curriculum, Linear Programing, *Mathematics Curriculum, Science Course Improvement Projects, Science Education, *Secondary Education, *Teaching Guides
Identifiers—*Biomedical Interdisciplinary Curriculum Project

This instructor's manual presents lesson plans for a unit of mathematics within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on biomedical applications in the mathematics areas of propagation of error, vectors and linear programing. Designed to accompany the student text, lesson plans include objectives, recommended teaching time, and remarks. Keys to problem sets are also included. (CS)

ED 188 940 SE 031 464
Biomedical Mathematics, Unit III: Quadratics. Student Text. Revised Version, 1976.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—76
Note—101p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Allied Health Occupations Education, Career Education, *Chemistry, *Instructional Materials, *Integrated Curriculum, *Mathematics Curriculum, Science Course Improvement Projects, Science Education, Secondary Education
Identifiers—*Biomedical Interdisciplinary Curriculum Project, Quadratic Equations

This student text presents instructional materials for a unit of mathematics within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on biomedical applications in the mathematical area of quadratics, as well as sections on scientific notation and molarity, pH scales, equilibrium and solubility, dissociation constants, chemical equilibria, and operations with complex numbers. (CS)

ED 188 941 SE 031 465
Biomedical Mathematics, Unit III: Quadratics. Instructor's Manual. Revised Version, 1976.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—76
Note—36p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Allied Health Occupations Education, Career Education, *Integrated Curriculum, Mathematics Curriculum, Science Course Improvement Projects, Science Education, *Secondary Education, *Teaching Guides
Identifiers—*Biomedical Interdisciplinary Curriculum Project, Quadratic Equations

This instructor's manual presents lesson plans for a unit of mathematics within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on biomedical applications in the mathematical area of quadratics, relating mathematical concepts to chemical concepts of pH, scientific notation, molarity, equilibrium and solubility, dissociation constants, and chemical equilibrium. Designed to accompany the student text, lesson plans include objectives, recommended teaching time, and remarks. Keys to problem sets are also included. (CS)

ED 188 942 SE 031 467
Biomedical Science, Unit II: Nutrition in Health and Medicine. Digestion of Foods; Organic Chemistry of Nutrients; Energy and Cell Respiration; The Optimal Diet; Foodborne Diseases; Food Technology; Dental Science and Nutrition. Student Text. Revised Version, 1975.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—75
Note—262p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC11 Plus Postage.
Descriptors—*Allied Health Occupations Education, Career Education, *Instructional Materials, *Integrated Curriculum, *Nutrition, Science Course Improvement Projects, Science Curriculum, *Science Education, Secondary Education
Identifiers—*Biomedical Interdisciplinary Curriculum Project

This student text presents instructional materials for a unit of science within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on nutrition in health and medicine and include sections on the digestion of foods, organic chemistry of nutrients, energy and cell respiration, diet, foodborne diseases, food technology, and dental science and nutrition. Reading materials, graphs, illustrations, and problems accompany each of 43 sections. (CS)

ED 188 943 SE 031 468
Biomedical Science, Unit III: The Circulatory System in Health and Science. The Heart and Blood Vessels; Blood and Its Properties; The Urinary Tract. Student Text. Revised Version, 1976.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—76
Note—78p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452. Contains occasional light type.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Allied Health Occupations Education, *Cardiovascular System, Career Education, *Instructional Materials, *Integrated Curriculum, Science Course Improvement Projects, Science Curriculum, *Science Education, Secondary Education
Identifiers—*Biomedical Interdisciplinary Curriculum Project

This student text presents instructional materials for a unit of science within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on the circulatory system, with emphasis on the heart and blood vessels, blood and its properties, and the urinary tract. Reading materials, graphs, illustrations, and problems accompany each of 23 sections. (CS)

ED 188 944 SE 031 469
Biomedical Science, Unit III: The Circulatory System in Health and Science. The Heart and Blood Vessels; Blood and Its Properties; The Urinary Tract. Instructor's Manual. Revised Version, 1976.
Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—76
Note—142p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—*Allied Health Occupations Education, *Cardiovascular System, Career Education, *Integrated Curriculum, Science Course Improvement Projects, Science Curriculum, *Science Education, Secondary Education, *Teaching Guides
Identifiers—*Biomedical Interdisciplinary Curriculum Project

This instructor's manual presents lesson plans for a unit of science within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. Lessons concentrate on the circulatory system, with emphasis on the heart and blood vessels, blood and its properties, and the urinary tract. Designed to accompany the student text, lesson plans include objectives, recommended teaching time, and remarks. Keys to problem sets are also included. (CS)

ED 188 945 SE 031 470
Biomedical Science, Unit III: The Circulatory System in Health and Science. The Heart and Blood Vessels; Blood and Its Properties; The Urinary Tract. Laboratory Manual. Revised Ver-

sion, 1976.

Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date—76

Note—92p.; For related documents, see SE 031 461-471, ED 174 409-430, and ED 174 446-452.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC04 Plus Postage.

Descriptors—*Allied Health Occupations Education, *Cardiovascular System, Career Education, *Integrated Curriculum, *Laboratory Manuals, Science Course Improvement Projects, Science Curriculum, *Science Education, Secondary Education

Identifiers—*Biomedical Interdisciplinary Curriculum Project

This laboratory manual presents activities for a unit of science within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. These twenty-five laboratory activities concentrate on biomedical problems in investigating various aspects of the circulatory system, providing concrete experiences for students to explore the heart and blood vessels, blood and its properties, and the urinary tract. (CS)

ED 188 946 SE 031 471

Biomedical Social Science, Unit II: Health, Culture and Environment. Student Text, Part Two: Aq Kupruk. Revised Version, 1975.

Biomedical Interdisciplinary Curriculum Project, Berkeley, Calif.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date—75

Note—123p.; For related documents, see SE 031 461-470, ED 174 409-430, and ED 174 446-452. Photographs will not reproduce well.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC05 Plus Postage.

Descriptors—*Allied Health Occupations Education, Career Education, Cultural Awareness, Environment, Health, *Instructional Materials, *Integrated Curriculum, Science Course Improvement Projects, Science Curriculum, Science Education, *Secondary Education, *Social Sciences, Social Studies, Units of Study

Identifiers—*Afghanistan, *Biomedical Interdisciplinary Curriculum Project

This student text presents instructional materials for a unit of social science within the Biomedical Interdisciplinary Curriculum Project (BICP), a two-year interdisciplinary precollege curriculum aimed at preparing high school students for entry into college and vocational programs leading to a career in the health field. This particular unit deals with world cultures and their relationship to health and environment. Reading, illustrations, and activities are presented that deal with the social structure of Afghanistan. (CS)

ED 190 356 SE 031 300

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Student Guide: Why You're You. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—148p.; For related documents, see SE 031 301-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC06 Plus Postage.

Descriptors—*Genetics, Grade 9, Heredity, Improvement Programs, Individualized Instruction, *Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Science Activities, Science Curriculum, Science Education, Secondary Education, Secondary School Science

Identifiers—Intermediate Science Curriculum Study

This is the student's text of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The chapters include basic information about heredity, activities, and optional "excursions." A section on introductory notes to the student explains how to use the book. Data tables and empty spaces within the workbook format indicate where responses are expected. Illustrations accompany all instructions and the students are expected to select the proper equipment based on the illustrations. (SA)

ED 190 357 SE 031 301

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Teacher's Edition: Why You're You. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—156p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC07 Plus Postage.

Descriptors—*Genetics, Grade 9, Heredity, *Individualized Instruction, *Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science

Identifiers—Intermediate Science Curriculum Study

This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The chapters include basic information about heredity, activities, and optional "excursions." The answers to all activities are included. An introduction describes the work of Gregor Mendel and his contribution to biology. An overview describes genetics since Mendel and the study of heredity as it relates to humans. Illustrations accompany the text. (SA)

ED 190 358 SE 031 302

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Record Book, Student Guide: Why You're You. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—60p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Genetics, Grade 9, Heredity, *Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Worksheets

Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the text as well as for the "excursions" and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 359 SE 031 303

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Record Book, Teacher's Edition: Why You're You. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—61p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains occasional colored print which may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Answer Sheets, Genetics, Grade 9, Heredity, *Individualized Instruction, *Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science

Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "Why You're You" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the text are recorded here. An introductory note to the student explains how to use the book and is followed by the notes to the teacher. Answers are included for the activities and the excursions. A self evaluation section is followed by its answer key. (SA)

ED 190 364 SE 031 308

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Student Guide: Investigating Variation. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—107p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC05 Plus Postage.

Descriptors—Grade 9, *Human Body, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, Mathematical Applications, *Measurement, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Statistics

Identifiers—*Intermediate Science Curriculum Study

This is the student's text of one unit of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on diversity in human populations, measurement, and data collection. Numerous activities are given and optional excursions encourage students to pursue a topic in greater depth. Data tables within the workbook format indicate where responses are expected. Illustrations accompany all instructions and the students are expected to select the proper equipment for experiments based on the illustrations. (SA)

ED 190 365 SE 031 309

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Teacher's Edition: Investigating Variation. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—114p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored and shaded drawings and print which may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC05 Plus Postage.

Descriptors—Grade 9, *Human Body, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, Mathematical Applications, *Measurement, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Statistics

Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on diversity in human populations, measurement, and data collection. Optional excursions are described for students who wish to study a topic in greater depth. An introduction describes principles of measurement, variation, correlation, prediction, and sampling. Illustrations accompany the text. (SA)

ED 190 366 SE 031 310
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Student Guide: Investigating Variation. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—62p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Grade 9, *Human Body, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Mathematical Applications, *Measurement, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Statistics, *Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book which accompanies the unit "Investigating Variation" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the student text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 367 SE 031 311
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Teacher's Edition: Investigating Variation. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—62p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Answer Sheets, Grade 9, *Human Body, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Mathematical Applications, *Measurement, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Statistics, Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "Investigating Variation" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and the excursions. A self evaluation section is followed by its answer key. (SA)

ED 191 694 SE 031 778
Mayer, William V., Ed.
Biology Teachers' Handbook. Third Edition.
Biological Sciences Curriculum Study, Boulder, Colo.
Pub Date—78
Note—585p.; For related document, see ED 040 075.
Available from—John Wiley and Sons, Inc., One Wiley Drive, Somerset, NJ 08873 ($16.95).
Pub Type— Information Analyses (070)
Document Not Available from EDRS.
Descriptors—*Biology, Concept Teaching, *Inquiry, Science Education, Science Instruction, Secondary Education, *Secondary School Science, Teacher Education, *Teaching Methods
Identifiers—*Biological Sciences Curriculum Study

This book deals with biology teaching and is intended for use by either the secondary school biology teacher or for the pre-service preparation of biology teachers to facilitate understanding of the Biological Science Curriculum Study (BSCS), it's philosophy of inquiry, and it's mode of disseminating the content of biology. Section one describes the status of biological education, the influence of BSCS on biological education, and biological education from 1960-1975. Section two includes teaching strategies and styles, reading strategies, strategies for laboratory activities, and strategies generally encompassing most aspects of science classroom instruction. Section three includes the nature and use of invitations to inquiry, causal factors in biology, quantitative relationships in biology, the concept of function in biology, and the concept of the self regulating organism. Section four discusses contemporary issues controlling the biology teacher and includes such topics as careers in science, sex education, and evolution. The last section relates what the future of biological education courses seems to be. (DS)

ED 193 020 SE 032 752
Valenti, Christopher
Keeping a Marine Aquarium - A Manual.
Delaware Univ., Newark. Coll. of Marine Studies.
Pub Date—Jun 79
Note—39p.; Contains colored photographs which may not reproduce well.
Available from—Sea Grant Information, College of Marine Studies, University of Delaware, Newark, DE 19711 ($2.50).
Pub Type— Guides - General (050)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Class Activities, Culturing Techniques, Field Trips, Fisheries, *Laboratory Procedures, *Maintenance, *Marine Biology, *Oceanography, *Science Education, Zoology

Presented is advice on how to set up and maintain a saltwater aquarium, and a discussion on everything from algae growth to constructing an underground filter to hatch brine shrimp. Information on which tropical and temperate animals are appropriate for marine aquaria and how to collect them is also included. (Author/SB)

ED 193 050 SE 032 949
Jorgensen, Joseph Schroeder, Marlene
Inhabitants of the Fresh-Water Community.
Citrus County Board of Public Instruction, Inverness, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—Jun 77
Note—37p.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Ecology, Elementary Secondary Education, Environmental Education, *Field Trips, Grade 6, Outdoor Education, *Plant Identification, Resource Units, *Science Instruction, *Water Resources
Identifiers—*Aquatic Organisms

This learner's guide is designed to assist middle school students in studying freshwater organisms. Following a brief introduction to freshwater ecology, simple line drawings facilitate the identification of plants and animals common to Florida's freshwater ecosystems. Emphasis of the short text which accompanies each illustration is upon the organism's appearance and habitat. A supplementary set of slides depicting some of the plants and animals discussed is available. (WB)

ED 193 052 SE 032 953
O'Toole, Kathleen P.
Patterns of Life in the Water. Student Field Studies of Two of Franklin County's Aquatic Ecosystems.
Franklin County School District, Apalachicola, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—77
Note—89p.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Biology, *Ecology, *Environmental Education, Field Trips, *Marine Biology, *Oceanography, Outdoor Education, *Science Education, Science Instruction, Secondary Education, *Water Resources
Identifiers—*Aquatic Organisms, Limnology

Described in this manual are two field investigations which utilize the natural environment to teach ecological principles to high school students. In groups of five to ten, students study two aquatic environments and then prepare a booklet which summarizes their work. The manual is divided into four parts: (1) teacher's guide; (2) student's guide; (3) rivers, lakes, and ponds; and (4) sandy beaches. The teacher's guide describes goals and objectives, prerequisite student knowledge and skills, and stages of group growth. An overview of basic ecological principles and a discussion of the field study goals comprise the student's guide. The remaining two parts provide instructions for investigating a freshwater and a marine ecosystem. These activities consist primarily of transect and quadrat studies, chemical analysis, and species identification. Included in the appendix are some field procedures and a list of references. (WB)

ED 194 321 SE 033 142
Mayer, William V.
Radiation and Its Use in Biology: A Laboratory Block.
Biological Sciences Curriculum Study, Boulder, Colo.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—70
Note—66p.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052) — Reference Materials (130)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Biology, *Instructional Materials, *Radiation Biology, *Science Activities, Science Course Improvement Projects, Science Curriculum, Science Education, Secondary Education, Secondary School Science, *Supplementary Reading Materials, *Teaching Guides, Units of Study
Identifiers—*Biological Sciences Curriculum Study

This booklet contains a six-week series of laboratory investigations that may be used individually or in combination to complement other biology course materials or as an independent laboratory course in radiation biology. Contents include twelve activities dealing with radiation biology, five additional activities suitable for individual work, and four appendices which cover the handling of microorganisms, a discussion on radiation, how radioactive materials are produced, and how a Geiger-Muller counter is operated. (CS)

ED 196 667 SE 033 203
Life Science: An Activity Guide.
Texas Education Agency, Austin. Div. of Curriculum Development.
Pub Date—80
Note—120p.
Available from—Publications Distribution Center, Texas Education Agency, 201 East 11th St., Austin, TX 78701 ($3.00).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Biological Sciences, Biology, *Instructional Materials, Laboratory Experiments, Laboratory Safety, *Science Activities, *Science Education, Science Instruction, Secondary Education, *Secondary School Science

This guide is designed to assist teachers in involving students in individual or small group laboratory investigative experiences in the life sciences. Each of the 22 experiments contains a prelab and postlab section for teachers and a detailed procedures section for students. (Author/CO)

ED 196 731 SE 034 032
On Campus Activity Guide. Environmental Education.
Pinellas County School Board, Clearwater, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—79
Note—47p.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Biology, Earth Science, *Ecology, *Environmental Education, Mathematics Education, *Outdoor Education, *Science Activities, Science Education, Science Instruction, Secondary Education, *Secondary School Science

Identifiers—Plants (Botany), *School Yards

Descriptions of about 100 secondary-level activities that can be done on the school grounds are presented. Among the lessons included are a study of life in sidewalk cracks, methods of estimating animal populations, soil testing, constructing and using triangulation instruments to map the school area, and creative writing exercises. Although most activities are science-oriented, many involve mathematics and language arts skills. (WB)

Secondary

Careers

ED 096 417 CE 002 016
Loebl, Stanley, Ed. And Others
Correlated Curriculum Program: An Experimental Program. Science Level 1 (9A, 9B, 10A).
New York City Board of Education, Brooklyn, N.Y. Bureau of Curriculum Development.
Pub Date Mar 70
Note—79p.
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Behavioral Objectives, Business Education, Career Education, Curriculum Design, Curriculum Guides, Health Education, Industrial Education, *Integrated Curriculum, *Science Units, *Secondary Grades, Student Evaluation, *Teaching Guides, Unit Plan, *Units of Study (Subject Fields)

The unit plans in Correlated Science 1 are intended to be of use to the teacher in both lesson and team planning. The course in science was designed for optimum correlation with the work done in business, health, and industrial careers. Behavioral objectives, class routines, time allotments, student evaluation, and the design of the manual are briefly discussed. The science topics taught are: controlling the indoor environment; light, the silent salesman; power for office machines; power for transportation; science at work in the auto service station; science in cleaning and laundering; and science and restaurant operations. Each unit contains time allotments, lesson aims, materials and equipment needed, motivations, concepts and understandings to be developed accompanied by suggested procedures and activities, a summary, and resource materials. Two units not correlated with the work of business careers (a unit on evolution and earth science) are listed. (BP)

ED 102 328 95 CE 003 029
Career Education: Learning with a Purpose. Junior High 7-9, Science.
State Fair Community Coll., Sedalia, Mo.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date [74]
Note—57p.; For other guides in the series, see Elementary K-2, CE 003 028; Mathematics, CE 003 030; English, CE 003 031; Social Studies, CE 003 032
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—*Career Awareness, *Career Education, Course Content, Course Objectives, *Curriculum Guides, *General Science, Integrated Curriculum, Junior High Schools, Resource Guides, Science Units, Teacher Developed Materials

The guide, prepared to supplement the existing curriculum, suggests activities for teachers related to three goals: (1) Self Goal: the student developing an awareness of who he/she is and through effective decision-making what he/she can become; (2) Society Goal: the student becoming aware of the interrelationships of society with his/her school, community, family, work, and leisure; and (3) World of Work Goal: the student becoming aware of the many facets of the world of work. All objectives, the eight student goals, and the activities are coded according to which major goal is emphasized. An outline of the philosophy and concepts of junior high school career education and exploratory work experience is followed by a guide for the integration of career education into any specified course. A major part of the guide consists of 16 science units: animals, astronomy, chemistry, conservation, drugs, ecology, force and machines, geology, human body, light, metric system, plants, magnetism, meteorology, oceanography, and sound. Each unit contains several career related activities, needed resources, and evaluation/outcome. Source lists for audiovisual materials, career and occupational information listed by occupational areas, and locally available field trip sites and guest speakers conclude the guide. (SA)

ED 107 764 CE 003 839
Lewis, Terry Cochran, Kathy
Science—Math Project: Junior High.
White Bear Lake Independent School District 624, Minn.
Pub Date [73]
Note—14p.; For related documents, see CE 003 833-8 and CE 003 840-9
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—Career Awareness, *Career Education, Grade 7, Grade 9, Instructional Materials, Junior High Schools, *Learning Activities, Mathematics Education, Mathematics Instruction, *Mathematics Materials, Science Education, Science Instruction, *Science Materials, Teacher Developed Materials

The guide, developed as part of an exemplary program for junior high school students, presents a plan for science and mathematics activities for grades seven and eight which aims at researching occupations which stem from experience students obtain in the general classroom curriculum. The unit is designed to operate in three stages: preparation of career backgrounds with students, completion of the career description form after the research field trip, and completion of the occupational interview sheets and reports to the class. The guide includes lists of objectives, preparation steps, activities (general and specific for science and math), and a discussion of results and evaluation. It also includes a sample interview sheet and career card. (JR)

ED 107 769 CE 003 844
Winnen, Charlotte Strenger, John
Occupational Computer System Adapted for Science for the Junior High Student.
White Bear Lake Independent School District 624, Minn.
Pub Date [73]
Note—18p.; For related documents, see CE 003 833-43 and CE 003 845-9
EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE
Descriptors—*Career Education, *Computer Assisted Instruction, Computer Programs, Computer Storage Devices, Information Systems, Information Utilization, Instructional Materials, Junior High Schools, *Occupational Clusters, *Science Careers, Science Curriculum, *Science Units, Teacher Developed Materials
Identifiers—Interactive Lrng Syst Guidance Occupl Info File, Minnesota, TIES Computer System, White Bear Lake

The guide, part of an exemplary career education program, contains a science unit for junior high school students which is designed to help students obtain information on science occupations found in the Interactive Learning System-Guidance-Occupational Information File of the TIES Computer System in Minneapolis-St. Paul. The guide lists goals and objectives and provides operating procedures for obtaining from the computer either the job description, worker requirements, and related jobs, or the occupational characteristics for any requested occupation. It also provides an eight-page list of science-related occupations with their appropriate job code numbers. It concludes with a sample computer tape printout. (JR)

ED 107 777 CE 003 864
Alexander, Elaine A.
Career Education in the Seventh Grade Science Class. Career Development Project.
University City School District, Mo.
Pub Date Jun 72
Note—47p.; For related documents, see CE 003 801-7, CE 003 862-3, and CE 003 865-75
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—*Career Awareness, *Career Education, Career Planning, *Curriculum Guides, Grade 7, Individual Development, Instructional Materials, Junior High Schools, Learning Activities, Library Collections, Organizations (Groups), Publications, Resource Guides, *Science Careers, Science Education, *Science Units, Self Concept, Teacher Developed Materials, Vocational Development

The guide aims at integrating the career education concepts of self-awareness, career awareness, and occupational awareness into the seventh grade science curriculum. Each of the units on self-knowledge, career preparation knowledge, and career planning contain goals, performance objectives, activities, and outcome measures. Unit activities include viewing films, listing 10 careers in science, applying for a job, and discussing the pros and cons of science careers. A list of materials (available in the Hanley Library) includes career cassette tapes, titles of books, and film titles. Additional suggested science-related activities and a career questionnaire are provided. The guide also includes 12 pages of career guidance publications listed alphabetically by career area, seven pages of alphabetically arranged addresses of resource organizations, and a three-page list of careers related to science and technology. (JR)

ED 107 824 CE 003 925
Career Activities in Science: Grades 7, 8, 9.
Boise City Independent School District, Idaho.
Spons Agency—Idaho State Dept. of Education, Boise.
Pub Date 74
Note—126p.; For related documents, see CE 003 923-4 and CE 003 926
EDRS Price MF-$0.76 HC-$6.97 PLUS POSTAGE
Descriptors—Career Awareness, *Career Education, *Career Exploration, Class Activities, *Curriculum Guides, Educational Objectives, Grade 7, Grade 8, Grade 9, Jobs, *Junior High Schools, *Occupational Clusters, Occupational Information, Resource Materials, Science Careers, *Science Curriculum, Science Experiments, Science Units

The career activities guide in science, part of an Idaho State Department of Vocational Education career exploration series for grades 7, 8, and 9, is designed as supplementary material to enrich the regular curriculum. Any one activity in the guide might be used without involving any other activities. The cross-referenced index indicates grades, subject, career cluster, occupation, and, in most instances, subject concept. Performance objectives, activity situation and steps (mainly scientific experiments), materials, and special recommendations are outlined for the various job titles. Career clusters included are: home economics and consumer, industrial arts; arts, crafts, humanities; business occupations; communications and media; hospitality and recreation; environmental control; personal service; manufacturing; transportation; health occupations; public service, agriculture and natural resources; marine science; marketing and distribution; construction; miscellaneous activities. Subject concepts involve various aspects of science such as temperature, extractions of colors, water testing, blood cells and types, substance analysis, insolubles, heating, simple machines, matter changes, plant growth, energy, gravity, weighing, power, air pollution, and weather bureau services. (EA)

ED 107 897 95 CE 004 008
[Secondary Career Education Activities: Science.]
Radford City Schools, Va.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Bureau No—V361010L
Grant—OEG-0-73-2990
Note—28p.; For related documents, see CE 003 996-CE 004 007 and CE 004 009-010
Available from—Kuhn Barnett Elementary School, 4th and Pendleton Streets, Radford, Virginia, 24141 (K-3 (39 units) $5.00; 4-7 (42 units) $5.00; Special Education (18 units) $5.00; 8-12 (107 units) $10.00)
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—Astronomy, *Career Education,

Chemical Reactions, *Curriculum Guides, Electrical Occupations, Engineering Technology, *High School Curriculum, Integrated Curriculum, Meteorology, Occupations, Oceanology, Photography, Radiation, Resource Materials, *Science Curriculum, *Secondary Education

Identifiers—*Radford Career Education Program

The guide is one of a series developed in a pilot project to integrate career education concepts with subject matter in secondary grades. The units are designed to reveal career orientation aspects of traditional topics within five major subject areas: English, social studies, mathematics, science, and health and physical education. The lesson plans are presented in brief outline form, but activities range from those of short duration to several weeks. All provide broad objectives, performance objectives, lesson procedures, and materials and resources in all media. The units in science directed to grades 8-12 cover five activities in electricity and related jobs, weather, the solar system, sea topography, mineralogy, photography as related to physical optics, nuclear chemistry, chemical changes, and machines. (MDW)

ED 114 677 95 CE 005 759

McCormick, Jim And Others

Careers: Units of Study, High School Level.

South Western City School District, Grove City, Ohio.

Spons Agency—Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

Report No—VT-102-205

Bureau No—V357016

Pub Date 73

Contract—OEC-0-73-6370

Note—62p.

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—Behavioral Objectives, *Career Education, *Cognitive Development, *Curriculum Guides, Grade 9, Grade 10, Integrated Curriculum, Language Arts, *Learning Activities, Mathematics, Post Testing, Pretesting, Science Units, *Secondary Education, Social Studies Units, Unit Plan, Units of Study (Subject Fields)

The curriculum guide contains units of study about careers appropriate for high school level students in grades 9 and 10. The units focus on the four areas of mathematics, science, social studies, and language arts. The document contains a discussion of fundamental cognitive skills and a rationale for each. The format for presenting each goal of the individual units consists of six columns headed: objectives, suggested implementation activities, thinking skill process, curriculum relationship, psychomotor relationship, and affective relationship. Pretests and post tests are provided for each unit. (LJ)

ED 117 325 CE 005 681

Activity Guide for Career Education. Senior High.

Festus School District R 6, Mo.

Spons Agency—Missouri State Dept. of Elementary and Secondary Education, Jefferson City Div. of Vocational Education.

Note—111p.; For related documents, see CE 005 678 680

EDRS Price MF-$0.83 HC-$6.01 Plus Postage

Descriptors—*Career Education, *Career Exploration, *Curriculum Guides, *Educational Objectives, Integrated Curriculum, *Learning Activities, Occupational Clusters, Secondary Education

The suggestions for learning activities in career education are presented with the aim of establishing career exploration opportunities with special emphasis on individual review and exploration. Objectives and activities, resources, and evaluations focus on four domains of career consciousness (self and interpersonal skills, knowledge of work and leisure world, career planning and knowledge skills, and basic studies and occupational preparation) relating to the following academic areas: communication arts (fourteen subject areas), fine arts (nine subject areas), mathematics (five subject areas), physical education (two subject areas), practical arts (four subject areas and their related studies), science (eight subject areas), and social studies (fourteen subject areas). Appended materials include career education resources, autobiographical questionnaires, value clarification exercise, value clarification method, an active exercise on valuing, the value game, puzzle exercise, nonverbal techniques in self expression, and a fantasy trip. (EC)

ED 117 565 CE 006 282

Career Education Resource Guide for Chemistry.

Louisiana State Dept. of Education, Baton Rouge.

Report No—VT-102-461

Pub Date 74

Note—78p.; For related documents, see CE 006 283-291

EDRS Price MF-$0.83 HC-$4.67 Plus Postage

Descriptors—*Career Education, *Career Opportunities, Career Planning, *Chemistry, Instructional Materials, *Learning Activities, Occupational Information, *Resource Guides, Science Curriculum, Secondary Education

Identifiers—Louisiana

The activities comprising the career education resource guide explore careers in chemistry or chemistry-related fields with limited treatment given to other science-related occupations. Units providing a general framework of chemical principles and related activities alternate with the career units. The career concepts most applicable to each unit are given with the unit. The Acquisition of Career-Entry Skills, Stage 5 of the Louisiana State Plan for Career Education, is emphasized. Information and experience built into the curriculum and into the career education activities are intended to help the student acquire these career-entry skills. A list of these skills is given for each unit. Making up one-third of the document, the appendix lists chemistry textbooks adopted for use in Louisiana schools; a reference code; instructional materials; lists of careers in, or related to, science and technology; an occupational study outline; and a list of information sources. (Author/NJ)

ED 117 567 CE 006 284

Career Education Resource Guide for Biology. Working Draft.

Louisiana State Dept. of Education, Baton Rouge.

Report No—VT-102-463

Pub Date 74

Note—41p.; For related documents, see CE 006 282-291

EDRS Price MF-$0.83 HC-$2.06 Plus Postage

Descriptors—*Biology, *Career Education, Career Exploration, Career Opportunities, *Learning Activities, *Occupational Information, *Resource Guides, Science Curriculum, Secondary Education

Identifiers—Louisiana

The resource guide integrates learning activities in biological science with an exploration of careers in biology or related fields. The materials are divided into seven units: tools of the scientist, basis for life, diversity (protists, plants, animals), structure and function, continuity (reproduction, development, and genetics), evolution, and ecological concepts. Each unit is discussed by subdividing the information or ideas into categories of: (1) content outline, (2) suggested curriculum activities, and (3) career information (occupational clusters, career activities and careers related to biology). Career activities may or may not relate to the specific subject matter with which it appears. The content outline suggests a possible sequence for covering materials while the activity column suggest exercises that could effectively be used with each unit or sub unit. A list of State adopted biology textbooks (categorized by learning level) and a career bibliography for grades 10-12 conclude the document. (Author/NJ)

ED 120 348 CE 005 684

7 .pfer, John And Others

Career Related Science Units. Teacher Edition.

Roseville Area School District 623, Minn.

Spons Agency—Minnesota State Dept. of Education, St. Paul. Div. of Vocational and Technical Education.

Pub Date Jul 73

Note—395p.; For related document, see CE 005 685

EDRS Price MF-$0.83 HC-$20.75 Plus Postage

Descriptors—Career Awareness, *Career Education, Career Exploration, Career Opportunities, Demonstration Projects, Elementary Education, Elementary School Science, *Individualized Instruction, *Instructional Materials, Junior High Schools, *Learning Activities, Occupational Information, Problem Solving, Science Activities, Science Careers, *Science Curriculum, Science Education, Secondary Education, Secondary School Science, Worksheets

The document is comprised of 91 career-related science modules for junior high school students, indexed by the learning activity's title and cross-referenced by occupation. The modules are intended for use in an individualized science program, either as an ongoing curriculum supplement or as a discrete unit. Integrated with the presentation of scientific theory, knowledge, and skills are information on applications in work settings and on employment opportunities in science and other fields. Problem-solving and science learnings relevant to students' practical, daily needs are emphasized. The module format, an illustrated worksheet, includes: title, cluster, occupation, prerequisites, objectives, equipment, procedure, data and results, evaluation, and teacher supplement. Most of the modules were designed to be completed during a 50-minute period, with equipment which can be stored in a small container. An introduction orients the science teacher to career education concepts and objectives, relates the goals and objectives of the career-science program, and specifies the science processes and skills which are developed in the modules. Alternative methods for using the modules are suggested, and a student introduction is provided. The modules are heavily biased toward traditional sex roles, no racial minorities are pictured in the illustrations. (Author/AJ)

ED 134 742 CE 009 543

A Teacher's Guide to Career Education, 9-12.

South Carolina State Dept. of Education, Columbia. Office of Vocational Education.

Pub Date Sep 75

Note—488p.

EDRS Price MF-$1.00 HC-$26.11 Plus Postage.

Descriptors—Affective Objectives, Biology Instruction, Business Subjects, *Career Education, *Career Exploration, Classroom Materials, Curriculum Guides, English Instruction, Integrated Activities, Language Instruction, *Learning Activities, *Lesson Plans, Mathematics Instruction, Physical Education, Science Instruction, Secondary Education, Social Studies Units, *Student Development, Teacher Developed Materials, Teaching Guides, Units of Study (Subject Fields), Vocational Education

Identifiers—South Carolina

Designed to assist the classroom teacher interested in implementing career education, this guide presents lesson plans, prepared by public school teachers, which integrate career education activities. Learner objectives, which provide a base for implementation plans, are listed in the introductory section and relate to self knowledge, decisionmaking skills, career awareness, economic awareness, educational awareness, attitudes and appreciation, and social awareness. Each lesson plan is presented in the following format: Grade or IGE unit, subject, educational concept, elements and element objectives, activities, resources, and followup activities. The lesson plans cover the units of math (grades 9-10); Spanish (grades 9-12); home economics (grades 9-12); agriculture (grades 9-12); physical education (grades 9-12); biology (grade 10), social studies (grades 9-12), math, geometry, algebra (grades 9-12), distributive education (grade 11); French I and II (grades 9-12), English (grades 9-12), art I and II (grades 9-12); office occupations (grades 9-12); health occupations (grade 12); trade and industry (grades 10-12); physical science and physics (grades 9 and 12), and office occupations (grades 11-12). (TA)

ED 136 061 08 CE 010 366

Burkhart, Phil

Planning for Career Education, Grades 7-9.

Pocatello School District 25, Idaho.

Spons Agency—Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

Bureau No—V361033L

Grant—OEG-0-73-2993

Note—279p.

EDRS Price MF-$0.83 HC-$15.39 Plus Postage.

Descriptors—Behavioral Objectives, Career Education, *Career Exploration, Curriculum Guides, Decision Making Skills, Field Trips, Fine Arts, Fused Curriculum, Health Education, Home Economics, Industrial Arts, Inservice Teacher Education, Junior High Schools, *Learning Activities, Learning Modules, Mathematics Curriculum, Occupational Guidance, Physical Education, *Program Development, Resource Materials, Science Units, *Skill Development, Social Studies Units, *Student Development, Teacher Developed Materials, Typewriting, Units of Study

Identifiers—Idaho

This guide describes a program designed to assist local school leaders in developing a career exploration program for grades 7-9. It is designed for implementation in the classroom structure and curriculum and is divided into seven sections: Introduction, Teacher Training, Career Resource Information Bank (CRIB), Field Trips, Positive Action, Evaluations, and Teaching Units. The 14 teaching units cover art, drafting, earth science, English, guidance and counseling, health and life science, home economics, industrial arts, mathematics, music, physical education, social studies, speech, and typing. Each of the units contains some or all of the following elements: Overall obectives, rationale, specific performance objectives, learning activities, sources of information, materials, resource people, budget summary, evaluation, hands on project. (TA)

ED 137 538 **08** **CE 010 435**

Career Education: Sample Lessons to Parallel the New York City Public Schools Senior High School Curriculum.

State Project to Implement Career Education, New York, N.Y.

Spons Agency—Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.

Bureau No—V261054L

Pub Date Aug 73

Grant—OEG-0-72-0736

Note—564p.; For related documents, see CE 010 431 and CE 010 434

EDRS Price MF-$1.00 HC-$30.13 Plus Postage.

Descriptors—*Career Education, Curriculum Guides, Decision Making Skills, English Curriculum, Fine Arts, Fused Curriculum, Industrial Arts, Language Arts, *Learning Activities, Mathematics Curriculum, Resource Materials, Science Units, Secondary Education, Skill Development, Social Studies Units, *Student Development, Teacher Developed Materials, Trade and Industrial Education, *Units of Study, *Vocational Development

Identifiers—*New York, New York (New York)

Lessons in this document are the product of a senior high school teachers' workshop sponsored by the State Project to Implement Career Education (SPICE) in New York City schools. These career education sample lessons, covering nine subject areas, are designed to be used along with regular curriculum materials and relate to self-awareness, career awareness, educational awareness, economic awareness, decisionmaking skills, employability skills, appreciations and attitudes, and beginning competencies. The nine subject areas are language arts (English, literature, drama/speech, reading, journalism), mathematics, science/biology, social studies, law in American society, art (high school art, art advertising, fashion design), industrial arts, music, and the world of work. Each lesson includes a curriculum concept, related career education concept, themes and objectives, activities, resources, and a method for student evaluation. (TA)

ED 141 499 **CE 010 919**

Bowman, Judith And Others

Getting Started: A Guide to Writing Your Own Curriculum. The Pennsylvania Guide for Instructional Improvement through Career Education. Junior High Volume 7-9.

Central Susquehanna Intermediate Unit 16, Lewisburg, Pa

Spons Agency—Pennsylvania State Dept. of Education, Harrisburg. Bureau of Instructional Support Services.; Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational and Technical Education.

Bureau No—74010G

Pub Date 76

Note—364p.; For related documents see CE 010 918-921

Available from—Central Susquehanna Intermediate Unit, P.O. Box 213, Lewisburg, Pennsylvania 17837 ($12.00)

EDRS Price MF-$0.83 HC-$19.41 Plus Postage.

Descriptors—*Career Education, *Career Exploration, Course Content, Curriculum Development, *Curriculum Planning, *Educational Objectives, Elementary Secondary Education, Fine Arts, *Fused Curriculum, Junior High Schools, Language Arts, *Learning Activities, Middle Schools, Occupational Guidance, Resource Guides, Secondary School Mathematics, Secondary School Science, Secondary School Teachers, Social Studies

Identifiers—Pennsylvania

Exercises and activities for incorporating career education into the junior high school curriculum (7-9) are contained in this teacher's manual. Activities are developed for language arts (78), mathematics (28) science (22), social studies (42), related arts/fine arts (56), and guidance (19). Teaching activities are written in a format which matches specific goals of school subjects with career education concerns (curriculum focus). Career education focus (DELLA Statement), estimated class time, essential resource materials, and the instructional process are outlined for each lesson. The appendix contains the following materials: DELLA Statements (generated for the Career Development Education Model), background in curriculum design, bibliography of suggested materials, interview sheet, list of career clusters, list of career-related games and simulation, index of publishers/distributors, lists of evaluation instruments, notes on role playing and on brainstorm technique and planning field trips, sample job application form, sample resumes, supplemental resources for guidance, and bibliography of materials dealing with sex bias. (TA)

ED 141 501 **CE 010 921**

Getting Started: A Guide to Writing Your Own Curriculum. The Pennsylvania Guide for Instructional Improvement through Career Education. Senior High Volume 10-12.

Central Susquehanna Intermediate Unit 16, Lewisburg, Pa.

Spons Agency—Pennsylvania State Dept. of Education, Harrisburg. Bureau of Instructional Support Services.; Pennsylvania State Dept. of Education, Harrisburg. Bureau of Vocational and Technical Education.

Bureau No—74010G

Pub Date 76

Note—498p.; For related documents see CE 010 918-921

Available from—Central Susquehanna Intermediate Unit, P.O. Box 213, Lewisburg, Pennsylvania 17837 ($16.00)

EDRS Price MF-$1.00 HC-$26.11 Plus Postage.

Descriptors—*Career Education, Career Planning, Course Content, Curriculum Development, *Curriculum Planning, *Educational Objectives, Fine Arts, *Fused Curriculum, Language Arts, *Learning Activities, Occupational Guidance, Resource Guides, Resource Materials, Secondary School Mathematics, Secondary School Science, Secondary School Teachers, Senior High Schools, Social Studies

Identifiers—Pennsylvania

Exercises and activities for incorporating career education into the secondary school curriculum (10-12) are contained in this teacher's manual. Activities are developed for language arts (112), mathematics (32), science (21), social studies (49), related arts/fine arts (61), and guidance (41). An index of titles is included for each subject area. Teaching activities are written in a format which matches specific goals of school subjects with career education concerns (curriculum focus). Career education focus (DELLA Statement), estimated class time, essential resource materials, and the instructional process are outlined for each lesson. The appendix contains the following materials: DELLA Statements (generated for the Career Development Education Model), background in curriculum design, bibliography of suggested materials, interview sheet, list of career clusters, lists of career-related games and simulation, index of publishers/distributors, lists of evaluation instruments, notes on role playing and on brainstorm technique and planning field trips, sample job application form, sample resumes, supplemental resources for guidance, and bibliography of materials dealing with sex bias. (TA)

ED 141 532 **CE 011 371**

Career Education Curriculum Model. A Guide for Teachers. Grades 9 through 12.

Alabama State Dept. of Education, Montgomery.

Pub Date 76

Note—166p.; For related documents see CE 011 369-371

EDRS Price MF-$0.83 HC-$8.69 Plus Postage.

Descriptors—Career Education, Curriculum Development, Curriculum Guides, Decision Making Skills, Educational Objectives, English Curriculum, Fused Curriculum, Grade 9, Grade 10, Grade 11, Grade 12, *Individual Development, Languages, *Learning Activities, Models, Resource Guides, Resource Materials, Science Curriculum, Secondary Education, Skill Development, Social Studies, Units of Study, *Vocational Development

Identifiers—Alabama

The structure of career education included in this curriculum guide for grades 9-12 is intended to provide a comprehensive, sequential, and integrated approach, based on the eight elements of the Comprehensive Career Education Model matrix (CCEM) adopted in Alabama. The eight elements are as follows: Self-awareness, career awareness, economic awareness, educational awareness, decisionmaking, beginning competency, employability skills, and attitudes and appreciations. Sample objectives, learning activities, and resources concerning each element are included for each grade level. Grade 9 includes 14 activities in the areas of English, foreign language, science-physical, biology, and social studies. In grade 10, there are 14 activities in the areas of biology, English, chemistry, social studies, and foreign language. In grade 11, there are 15 activities in the areas of chemistry, English, social studies, and foreign language, and in grade 12, there are 6 activities in the areas of English and social studies. (TA)

Secondary

Chemistry

ED 070 597 **SE 014 898**
Buffaloe, Jacquelin F.
Reactions of Atoms and Molecules, Science (Experimental): 5316.02.
Dade County Public Schools, Miami, Fla.
Pub Date 71
Note—16p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Atomic Structure, Behavioral Objectives, *Chemistry, *Curriculum, Instructional Materials, *Objectives, Science Education, *Secondary School Science, *Teaching Guides
Identifiers—*Quinmester Program

This course, intended for first year chemistry students, introduces the mole concept through the use of experimentation. Performance objectives are specified and a course outline is given. A total of 42 experiments from eight texts, sources for eight demonstrations, and suggestions for accompanying film strips and film loops are included. Lists of report topics, projects, sample problems, and discussion questions are provided; speakers and field trips in the Dade County area are suggested. Bibliographies of four state adopted texts and 18 other references are included. For other documents in this series, see ED 062 175 through ED 062 180. (DT)

ED 070 916 **AC 014 058**
Atomic Structure and Valence: Level II, Unit 10, Lesson 1; Chemical Bonding: Lesson 2; The Table of Elements: Lesson 3; Electrolysis: Lesson 4. Advanced General Education Program. A High School Self-Study Program.
Manpower Administration (DOL), Washington, D. C. Job Corps.
Report No—PM-431-73; PM-431-74; PM-431-75; PM-431-76
Pub Date Nov 69
Note—72p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Academic Education, Achievement Tests, Atomic Structure, *Autoinstructional Aids, Chemical Bonding, Chemical Nomenclature, Chemical Reactions, Chemistry, *Course Content, Credit Courses, *General Education, *Independent Study, Secondary Grades

This self-study program for high-school level contains lessons on Atomic Structure and Valence, Chemical Bonding, The Table of Elements, and Electrolysis. Each of the lessons concludes with a Mastery Test to be completed by the student. (DB)

ED 080 359 **SE 016 606**
Weaver, Elbert C.
Experiments in the Chemistry of Food.
Manufacturing Chemists Association, Washington, D.C.
Pub Date Apr 73
Note—30p.; Prepublication edition
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Chemistry, Elementary School Science, *Food, Instructional Materials, *Laboratory Manuals, *Nutrition, Science Activities, Science Education, *Science Experiments, Secondary School Science

This booklet presents 18 experiments in the chemistry of food, suitable for elementary and secondary school science classes. Experiments deal with an analysis of milk, determinations of the amounts of sulfur dioxide, iron, and fat in foods, and the concentration of vitamin C in fruit juice and iodine in salt. Tests are provided for fats, carbohydrates, sugars, starches and proteins in various foods, and the presence of calcium propionate in bread. Other experiments include the identification of colors in food and factors involved in the discoloration of fresh fruit, the conversion of molasses into granulated sugar, the recovery of iodine from seaweed and caffeine from tea, and investigations relating to toasting bread and popping corn. (JR)

ED 080 378 **SE 016 644**
Lane, Robert
Chemistry [Sahuarita High School Career Curriculum Project].
Sahuarita High School District 130, Ariz.
Pub Date [73]
Note—46p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Chemistry, Curriculum, *Curriculum Guides, Instructional Materials, Science Activities, Science Education, *Science Units, *Secondary School Science, *Teacher Developed Materials, Units of Study (Subject Fields)

This course entitled "Chemistry" is one of a series of instructional guides prepared by teachers for the Sahuarita High School (Arizona) Career Curriculum Project. It consists of three packages, the first dealing with solids, liquids and solutions, the second with acids, bases and anions, and the third with cation analysis. These packages are further divided into units of study which cover the topics of kinetic-molecular theory, gas laws, solution-suspension, ionization, acids-bases, anions analysis, oxidation-reduction, and cation analysis. The units provide objectives, sources of information, notebook questions, laboratory activities, and evaluations. Twenty-two behavioral objectives are listed for the course. For related units in this series see SE 016 635 - SE 016 643. (JR)

ED 081 193 **EM 011 339**
Teaching Guide and Problem Supplement. A Publication of the Exemplary Project Problem Solving Computer Style 1969-1970.
New Orleans Public Schools, La.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Report No—DPSC-67-3834
Pub Date 70
Grant—OEG-3-7-70384-4813
Note—203p.
EDRS Price MF-$0.65 HC-$9.87
Descriptors—Algebra, Chemistry, *Computer Assisted Instruction, Computers, *Computer Science Education, Mathematics, Physics, *Problem Solving, *Programing, Secondary Grades, Secondary School Students, *Teaching Guides, Trigonometry
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Fortran IV, IBM 1130 Computer

Secondary school teachers incorporating the use of a computer in algebra, trigonometry, advanced mathematics, chemistry, or physics classes are the individuals for whom this book is intended. The content included in it is designed to aid the learning of programing techniques and basic scientific or mathematical principles, and to offer some solutions to illustrative problems. Eight units are devoted to a step-by-step explanation of the FORTRAN IV language and programing, with material presented in a manner which assists the teacher in developing lectures and other forms of instruction which facilitate student imitation and encourage early operation of his initial attempt at programing. Following this introduction to FORTRAN and to programing is a problem supplement with five sections, one each devoted to algebra, trigonometry, advanced math, chemistry, and physics. A short bibliography is also included. (Author/LB)

ED 086 479 **SE 016 425**
Jones, Naomi
Learning Activity Package, Chemistry I. LAP Numbers 22, 23, 24, 25, 26, 27, and 28.
Ninety Six High School, S. C.
Pub Date 72
Note—74p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Behavioral Objectives, *Chemistry, *Curriculum, *Individualized Instruction, *Instructional Materials, Science Education, Secondary School Science, *Study Guides, Teacher Developed Materials, Units of Study (Subject Fields)

As a set of seven Learning Activity Packages (LAPs) for individualized instruction in chemistry, the units cover the unit system, matter, energy, atomic structures, chemical formulas, physical states of matter, solutions and suspensions, ionization, acids, bases, and salts. Each unit contains a rationale for the material; a list of behavioral objectives for the unit; a list of resources including texts, laboratory experiments, audiovisual aids, science activities, and specified questions; a problem set for student self-evaluation; suggestions for advanced study; and references. A related chemistry LAP set is SE 016 426. Pages in LAP 25 will reproduce poorly. (CC)

ED 086 480 **SE 016 426**
Jones, Naomi
Learning Activity Package, Chemistry II. LAP Numbers 39A, 39B, 39C, 40, 41, 41A and 42.
Ninety Six High School, S. C.
Pub Date 72
Note—66p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Behavioral Objectives, *Chemistry, *Curriculum, *Individualized Instruction, *Instructional Materials, Science Education, Secondary School Science, *Study Guides, Teacher Developed Materials, Units of Study (Subject Fields)

As a set of seven Learning Activity Packages (LAPs) for individualized instruction in chemistry, the units cover problems in stoichiometry, energy levels, chemical bonding, matter and its forms, electrochemical processes, chemical kinetics and equilibrium, metals, and non-metals. Each unit contains a rationale for the material; a list of behavioral objectives for the unit; a list of resources including texts, periodical articles, laboratory experiments, audiovisual aids, and science activities; a problem set for student self-evaluation; and suggestions for advanced study. A related chemistry LAP is SE 016 425. (CC)

ED 086 523 **SE 017 123**
Williams, Russell R.
Nuclear Chemistry, Science (Experimental): 5316.62.
Dade County Public Schools, Miami, Fla.
Pub Date 72
Note—14p.; An Authorized Course of Instruction for the Quinmester Program
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Atomic Structure, Atomic Theory, Behavioral Objectives, Chemistry, Instructional Films, *Instructional Materials, Laboratory Procedures, Science Education, Secondary School Science
Identifiers—*Quinmester Program

This nuclear chemistry module includes topics on atomic structure, instability of the nucleus, detection strengths and the uses of radioactive particles. Laboratory work stresses proper use of equipment and safe handling of radioactive materials. Students with a strong mathematics background may consider this course as advanced work in chemistry. A reference list of six books is given and twelve performance objectives are stated. The course outline presents seven topics: (1) Units; (2) Nuclear Composition; (3) Nuclear Activity; (4) Radiation; (5) Nuclear Rearrangement; (6) Application; and (7) Safety. Experiments, including several from the United States Atomic Energy Commission, are indicated. Demonstrations, projects, reports, field trips, and suggested guest speakers are incorporated into the program. References include films and readings. A master sheet coordinates the entire curriculum. (Author/EB)

ED 086 528 **SE 017 128**
Matzuga, Ronald J.
The World of Matter, (Experimental): 5311.07.
Dade County Public Schools, Miami, Fla.
Pub Date 72

Note—14p., An Authorized Course of Instruction for the Quinmester Program

DRS Price MF-$0.65 HC-$3.29

Descriptors—Behavioral Objectives, *Chemistry, *Curriculum Guides, Instructional Aids, Instructional Films, *Instructional Materials, Science Education, *Secondary School Science

Identifiers—*Quinmester Program

This is an experimental course of study designed to introduce the junior high school student to the field of chemistry through his knowledge and understanding of chemical reactions which take place in his world. The everday experiences which the student encounters show the classification, phases, and changes of matter. No prerequisite courses are suggested for this study .of the World of Matter. Several state-adopted texts are listed, including those of physical science, general science, chemistry and the nature of matter. Six performance objectives are suggested based on a course outline divided into six major topics: (1) Matter; (2) States of Matter; (3) Changes in Matter; (4) Classification of Matter; (5) Observation of Chemical Reactions; and (6) Practical Use of Chemistry. Student-involved activities include experiments (drawn from several different sources), and viewing of films. A list of 16 reference books is included. A master sheet organizes the laboratory experiments, the student texts, the supplementary references and films and/or transparencies to be used with each of the major concepts to be presented. (Author/EB)

ED 089 036 **CE 001 082**

Chemistry: Curriculum Guide.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date [70]

Note—126p.

EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE

Descriptors—Audiovisual Aids, Bibliographies, *Career Education, *Chemistry, *Curriculum Guides, Educational Objectives, Educational Resources, Instructional Materials, Occupational Information, *Performance Specifications, Resource Materials, *Secondary Grades, Teaching Methods, Units of Study (Subject Fields)

Identifiers—Texas

The guide is arranged in vertical columns relating the chemistry curriculum concepts to curriculum performance objectives, career concepts and career performance objectives, suggested teaching methods, and resource materials. Occupational information for 40 different occupations includes job duties, educational requirements, salary range, and employment opportunities. An additional eighteen chemistry-related occupations are listed. Space is provided for teachers' additions, deletions, notes, and criticisms, which will be useful when the guide is revised. Appendixes list suggestions for teaching-learning activities; significant terms and names in chemistry, references to free or inexpensive publications in chemical career fields, additional sources of career information, selected references and periodicals for career information. (DS)

ED 089 984 **SE 017 511**

Altieri, Donald Becht, Paul

Individualization of Instruction: High School Chemistry - A Case Study.

Florida Educational Research and Development Council, Gainesville.

Pub Date Jan 74

Note—40p

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Case Studies, *Chemistry, Curriculum, Educational Research, Evaluation, *Individualized Instruction, *Program Descriptions, *Secondary School Science, Student Attitudes

Identifiers—Research Reports

This publication contains information on the individualization of instruction in high school chemistry in the form of a case study. The subject of the case study is the P. K. Yonge Laboratory School of the University of Florida, Gainesville. The instructional model, however, was also field-tested in 18 schools during 1971-72 and 1972-73. The publication is divided into five sections: foreword, history, individualized chemistry program, how to begin individualizing instruction, and individualized chemistry field study and results. In the foreword, individualized instruction is defined as not consisting of study packets, audio-tutorial programs, self-pacing, systems approach, and instructional or behavioral objectives. A four-part operational definition of individualized instruction as exemplified in the reported chemistry program is then presented. (PEB)

ED 090 030 **SE 017 610**

Rasmussen, Roy S.

Biochemistry, Science (Experimental): 5317.66.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—24p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Behavioral Objectives, *Biochemistry, Chemistry, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction provides a laboratory oriented study of the chemical reaction involved in the life processes. Students enrolling in this course should have successfully completed the units on Scientific Mathematics, Introduction to Chemistry, Reactions of Atoms and Molecules, and Chemistry of Carbon and Its Compounds. The booklet lists texts recommended as student references and states the performance objectives for the unit. It provides an outline of the course content and suggests special laboratory procedures, laboratory experiments, and appropriate readings from a variety of books and periodicals. Also listed are relevant films available from the Dade County Audiovisual Center and other sources. A master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 091 177 **SE 017 623**

Brennan, John

Types of Reactions, Science (Experimental): 5317.64.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—17p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Chemical Analysis, Chemistry, College Science, *Curriculum Guides, Individualized Instruction, Science Education, *Secondary School Science, Study Guides

Identifiers—*Quinmester Program

This course guide is the fifth in a series dealing with chemistry. The course is specifically designed for students interested in taking the Advanced Placement Chemistry examination and thus is equivalent to a first year college general chemistry course. Included in the guide are performance objectives, visual aids, a course outline, a list of textbooks and laboratory manuals, and suggestions for implementation. (JC)

ED 093 599 **SE 016 983**

Jackland, Thomas And Others

Environmental Chemistry Activities.

Milwaukee Public Schools, Wis. Div. of Curriculum and Instruction.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 72

Note—69p.

EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE

Descriptors—*Chemistry, Curriculum, *Curriculum Enrichment, *Environmental Education, Instruction, Instructional Materials, *Science Activities, Science Education, *Secondary School Science

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Milwaukee Public Schools

The authors of this curriculum supplement believe in a laboratory approach to chemistry and express the feeling that environmental chemistry provides the students an opportunity to apply theoretical chemistry to important practical problems. There are eighteen activities presented, each accompanied with behavioral objectives, one or more suggested methods of procedure, an introduction giving pertinent facts related to the concept being studied, and the materials needed. In some instances there is a suggested Follow Up Teacher Demonstration. A set of environmental chemical equations is included as well as a detailed table. Selected Environmental Pollutants, taken from the United Nations Conference on the Human Environment. The reference list suggests seven publications regarded as being pertinent and useful to any chemistry teacher involved with environmental chemistry. (EB)

ED 093 655 **SE 017 612**

Buffaloe, Jacquelin F.

Dynamic Nature of Atoms and Molecules, Science (Experimental): 5316.06.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—26p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Atomic Theory, *Chemical Equilibrium, *Chemistry, Instruction, *Instructional Materials, Kinetic Molecular Theory, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction deals with the study of both physical and chemical systems in equilibrium. It provides the student with instruction that will enable him to predict products in solubility, acid-base, and oxidation-reduction reactions and to write and balance equations for these reactions and solve problems involving equilibria constants. Students will gain more from this course if they have had some previous work in energy concept of atoms and molecules. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides a course outline; suggests experiments, demonstrations, projects, reports, speakers, and field trips; and presents a series of related mathematical problems. Films, film loops, filmstrips, and several reference books are recommended. A master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 093 657 **SE 017 615**

Scholz, Robert

Industrial Chemistry, Science (Experimental): 5316.07.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—23p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—Behavioral Objectives, *Chemical Industry, *Chemistry, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction presents some important and interesting processes carried on daily in industry and which result in products with which the student is familiar. The student will be responsible for learning some reactions involving these chemical processes and the quantitative calculations of these reactions. Fractional distillation, metallurgy, plastics, and the chemistry involved in food processing are a few areas that are studied. It is a course set primarily for the student who is not college-bound. The booklet lists the relevant state-adopted texts and states the performance objectives for the course. It provides a course outline and suggests experiments, films available from the Dade County Audiovisual Center, sample problems, and discussion questions. Sources of free materials are listed as well as reference books and project work. A master sheet is provided relating each suggested activity to the specific performance objectives. EB)

D 093 686 **SE 018 006**
Reynard, Dale C.
Computer Programs for Chemistry Experiments I and II.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 24 Sep 73
Note—50p.; Not available in hardcopy due to marginal legibility of original document
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($1.00, make checks payable to the Del Mod System)
EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—*Chemistry, *Computer Assisted Instruction, Curriculum Guides, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This unit of instruction includes nine laboratory experiments. All of the experiments are from the D.C. Health Revision of the Chemical Education Materials Study (CHEMS) with one exception. Program six is the lab from the original version of the CHEMS program. Each program consists of three parts (1) the lab and computer hints, (2) the description of a sample run, and (3) the actual sample run. The programs may be used as a check for actual student calculations or where the mathematics seems extermely difficult, for running the actual program. To use these programs with understanding, suggested reference materials are listed. A cross reference list for ach of the programs is included in the manual ndicating the code, the Health curriculum lab number and the Freeman lab number. Concepts covered include: (1) Masses of Equal Volumes of Gases, (2) Cooper-Silver Nitrate Reaction, (3) Conservation of Mass, (4) Formula of a Hydrate, (5) Reaction of magnesium Equilibrium, (8) Acid-Base Titration, and (9) Molar Concepts. (EB)

ED 095 028 **SE 018 186**
Jones, Naomi
Learning Activity Package, Chemistry I, (LAP) Study 29.
Ninety Six High School, S. C.
Pub Date [74]
Note—11p.; See ED 086 479 - 480 for related chemistry LAP materials
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Chemistry, *Individualized Instruction, Instructional Materials, Learning Activities, Science Education, *Secondary School Science, Self Help Programs, Units of Study (Subject Fields)
Identifiers—Carbon, LAP, Learning Activity Package

Presented is a Learning Activity Package (LAP) study concerned with carbon and its compounds. This LAP in chemistry includes a rationale for studying the chemical element of carbon, a list of student objectives (stated in behavioral terms), of activities (reading, laboratory experiments, model construction, etc.), a two-page worksheet, a self-evaluation, and a list of suggested activities for advanced study. (PEB)

ED 096 117 **SE 018 017**
Henderson, Paula
pH [Measure of Acidity].
Delaware State Dept. of Public Instruction, Dover., Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—12p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Biology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with the study of the pH of given substances by using litmus and hydrion papers. It is a learning activity directed toward low achievers involved in the study of biology at the secondary school level. The time suggested for the unit is 25-30 minutes (plus additional time for further pH testing). The equipment needed is itemized. With the student script there is included a pH worksheet that can be used for recording the observations made and answering suggested questions relevant to observations made. (EB)

ED 096 120 **SE 018 020**
Sokol, William
Observation Chemistry.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.; For a related document, see SE 018 023
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *Chemistry, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This packet an autoinstructional program for secondary school chemistry students is presented. No prerequisites are suggested. It can be used with high, medium or low level achievers. The behavioral objective is presented directed towards the students' achievement in listing observations made. Equipment and materials needed are listed. A bibliography, instructions, the suggested experiment and a corresponding optional experiment are included in the lesson. (EB)

ED 096 122 **SE 018 022**
Reister, W. A.
Characteristics of Transverse and Longitudinal Waves.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date [73]
Note—19p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Instruction, *Instructional Materials, *Physics, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This monograph presents an autoinstructional program in the physical sciences. It is considered useful at the higher, middle and lower high school levels. Three behavioral objectives are listed and a time allotment of 35-40 minutes is suggested. A bibliography is included. A script, incorporating the use of a cassette player and slides, is used by the student when attempting the six experiments in the packet. Student objectives, a set of review questions and a vocabulary sheet are part of the instructional packet. (EB)

ED 096 123 **SE 018 023**
Sokol, William
Introduction to Graphing.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—19p.; For a related document, see SE 018 020
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—Autoinstructional Programs, *Chemistry, *Graphs, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

In this autoinstructional packet, the student is given an experimental situation which introduces him to the process of graphing. The lesson is presented for secondary school students in chemistry. Algebra I and a Del Mod System program (indicated as SE 018 020) are suggested prerequisites for the use of this program. Behavioral objectives are listed. A three hour time allotment is suggested. The equipment and materials needed are itemized. The experiment to be performed consists of two parts. Part I involves determining how to get the best out of a bunsen burner and Part II, determining the optimum distance separating flame and object heated. Data are collected for six trial runs and graphed accordingly. (EB)

ED 096 125 **SE 018 026**
Sokol, William
The Direct Relationship.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.; Related documents are SE 018 018, 020, and 023
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Aids, *Chemistry, *Graphs, Instruction, *Instructional Materials, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program deals with experiences that will aid chemistry students at the secondary school level to determine the slope of the straight line graph relating the variables in a given set of data involving a direct relationship. Prerequisites set for this activity include three Del Mod System packets (SE 018 018, SE 018 020, and SE 018 023). Two behavioral objectives are presented. No equipment is necessary. A time allotment of 35 minutes is needed. (EB)

ED 101 012 **TM 004 247**
Goldman, Bert A. Saunders, John L.
Directory of Unpublished Experimental Mental Measures. Volume 1.
Pub Date 74
Note—236p.
Available from—Behavioral Publications, 72 Fifth Avenue, New York, New York 10011 ($12.95)
Document Not Available from EDRS.
Descriptors—Achievement Tests, Adjustment (to Environment), Aptitude Tests, Attitude Tests, *Bibliographies, Cognitive Tests, Communication (Thought Transfer), Creativity Tests, Development, Emotional Adjustment, Family (Sociological Unit), Institutions, Interest Tests, Motivation, Personal Adjustment, Personality Tests, *Psychological Tests, Social Adjustment, *Tests

The publisher proposes to supplement the Mental Measurements Yearbook by publishing periodic surveys to tests not available commercially. Based on the 1970 issues of 29 journals, its orientation is predominantly educational, but includes material related to psychology, sociology, and personnel work. Mental measures are organized under 22 categories: achievement, adjustment (educational), adjustment (psychological), adjustment (social), aptitude, attitudes, communication, concept meaning, creativity, development, family, institutional information, interest, motivation, personality, perception, preference, problem-solving, status, trait measurement, values and vocational evaluation. Any of the following facts available are listed for each measure: test name, purpose, description (number of items, time required, format), statistics (reliability and validity), source (author and journal title in which the test was mentioned), and related research. (RC)

ED 113 171 **SE 019 677**
Chemistry: Experiments, Demonstrations and Other Activities Suggested for Chemistry.
New York State Education Dept., Albany. Bureau of Secondary Curriculum Development.
Pub Date 75
Note—378p.
Available from—Publications Distribution Unit, Room 169, Education Building, Albany, N.Y. 12224 ($1.50 to residents of New York State; free copies are available to New York State school personnel when ordered through a school administrator)
EDRS Price MF-$0.76 HC-$19.67 Plus Postage
Descriptors—*Chemistry, *Curriculum, *Instructional Materials, *Science Activities, Science Education, Science Materials, Secondary Education, *Secondary School Science

This publication is a handbook used in conjunction with the course of study in chemistry developed through the New York State Education Department and The University of the State of New York. It contains experiments, demonstrations, and other activities for a chemistry course. Areas covered include the science of chemistry, the atomic structure of matter, solutions, metals and metallurgy, non-metals, ionization, acids, bases and salts, organic chemistry, nuclear energy, and reaction principles. Suggestions are included in the appendices relating to visual aids, planning field trips, preparing reports, suggested readings and facts related to equipment and supplies. General references and bibliographical data are included. (EB)

ED 117 565 **CE 006 282**
Career Education Resource Guide for Chemistry.
Louisiana State Dept. of Education, Baton Rouge.
Report No—VT-102-461
Pub Date 74
Note—78p.; For related documents, see CE 006 283-291
EDRS Price MF-$0.83 HC-$4.67 Plus Postage
Descriptors—*Career Education, *Career Opportunities, Career Planning, *Chemistry, Instructional Materials, *Learning Activities, Occupational Information, *Resource Guides, Science Curriculum, Secondary Education
Identifiers—Louisiana

The activities comprising the career education resource guide explore careers in chemistry or chemistry-related fields with limited treatment given to other science-related occupations. Units providing a general framework of chemical principles and related activities alternate with the career units. The career concepts most applicable to each unit are given with the unit. The Acquisition of Career-Entry Skills, Stage 5 of the Louisiana State Plan for Career Education, is emphasized. Information and experience built into the curriculum and into the career education activities are intended to help the student acquire these career-entry skills. A list of these skills is given for each unit. Making up one-third of the document, the appendix lists chemistry textbooks adopted for use in Louisiana schools,-a reference code, instructional materials, lists of careers in, or related to, science and technology; an occupational study outline, and a list of information sources. (Author/NJ)

ED 128 207 **SE 021 290**
Schlenker, Richard M.
Investigations In Marine Chemistry: Salinity II.
Pub Date [76]
Note—17p.; For related document, see SE021289
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Chemistry, *Instructional Materials, *Oceanology, *Physical Sciences, Science Education, *Secondary Education, *Secondary School Science, *Units of Study (Subject Fields)
Identifiers—Salinity

Presented is a science activity in which the student investigates methods of calibration of a simple conductivity meter via a hands-on inquiry technique. Conductivity is mathematically compared to salinity using a point slope formula and graphical techniques. Sample solutions of unknown salinity are provided so that the students can sharpen their salinity measuring abilities. Evaluation exercises as well as suggestions for further study are included. (Author/EB)

ED 133 197 **SE 021 773**
Blanchard, Paul A.
Atoms in Astronomy.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-128
Pub Date Sep 76
Note—42p.; For related documents, see SE 021 774-776
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00656-0, $1.20)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Astronomy, *Atomic Structure, *Chemical Analysis, Chemistry, Curriculum, *Instructional Materials, Science Education, Secondary Education, *Secondary School Science, Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration, *Spectroscopy

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. A Basic Topics section discusses atomic structure, emphasizing states of matter at high temperature and spectroscopic analysis of light from the stars. A section on Intermediate and Advanced Topics provides greater detail and more mathematical analysis of spectroscopy theory, including the quantum theory of electromagnetic radiation, electron orbits, and the classification of stellar spectra. Appendices include a glossary of unfamiliar terms, references and teaching aids, suggested class exercises, and questions and answers. (MH)

ED 133 198 **SE 021 774**
Gammon, Richard H.
Chemistry Between The Stars.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-127
Pub Date Sep 76
Note—66p.; For related documents, see SE 021 773-776; Photographs may not reproduce well
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00655-1, $1.60)
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Astronomy, Chemical Analysis, *Chemistry, Curriculum, *Instructional Materials, Science Education, Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics are covered: the physical conditions in interstellar space in comparison with those of the earth, particularly in regard to gas density, temperature, and radiation; the concept of quantized molecular motion (electronic, vibrational, rotational), and the corresponding energy ranges of radiation; spectroscopic methods for identifying molecules in space, the organic nature of interstellar chemistry, and application of our knowledge of interstellar molecules to study the birth of stars, the structure and movement of our galaxy, the history of interstellar matter, and the origin of the universe and life. Each section is followed by questions and answers, and an appendix contains suggested student projects. Also included are a glossary of terms and suggested reference materials. (MH)

ED 161 752 **SE 025 232**
Developmental Draft for Regents Chemistry Syllabus.
New York State Education Dept., Albany. Bureau of General Education Curriculum Development.; State Univ. of New York, Albany.
Pub Date—Oct 78
Note—173p.; Not available in hard copy due to print quality of original
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Chemistry, *Courses, *Curriculum, Instruction, *Laboratory Procedures, Organic Chemistry, Science Education, Secondary Education, Secondary School Science, *State Curriculum Guides

This booklet represents a developmental draft syllabus for Regents chemistry course in New York State. The introduction to the syllabus includes information about the prerequisites to the course, the teaching sequence, the laboratory procedure, the time requirement, and how to use the course for credit towards a State diploma. The syllabus is divided into two parts, and the material is organized under three headings: Topics, Understanding, and Fundamental Concepts and Supplementary Information. Part I has nine units: (1) Matter and Energy; (2) Atomic Structure; (3) Bonding; (4) Periodic Table; (5) Mathematics of Chemistry; (6) Kinetic and Equilibrium; (7) Acids and Bases; (8) Redox and Electrochemistry; and (9) Organic Chemistry. Part II has, in addition to the same nine units of Part I, another three units: Industrial Applications, Nuclear Chemistry and Laboratory Activities, making a total of 12 units for Part II. (GA)

ED 174 474 **SE 028 546**
Cost, Helen And Others
Oakland County Science Safety Series: Reference Guide for Chemistry.
Oakland County Schools, Pontiac, Mich.
Pub Date—77
Note—121p.; For related documents, see SE 028 544-547; Not available in hard copy due to copyright restrictions; Contains occasional colored pages which may not reproduce well ; Guide prepared by the Division of Instruction
Available from—Oakland Schools, Division of Instruction, 2100 Pontiac Lake Road, Pontiac, Michigan 48054 ($8.50 complete set; $2.50 ea.)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Accident Prevention, *Chemistry, Laboratory Procedures, *Laboratory Safety, Safety, Safety Equipment, *School Safety, Science Education, *Science Instruction, *Secondary Education

This reference guide is intended to organize and suggest acceptable practices and procedures for dealing with safety in the area of chemistry instruction. It is intended as a resource for teachers, administrators and other school staff both in planning for science activities and in making daily decisions concerning safety. Sections include discussion of safety responsibility, safety training for students, chemicals, gases, heat sources, working with glass and plastics, accident prevention, and first aid. Several appendices deal with specialized considerations. (Author/RE)

ED 179 419 **SE 029 447**
Chemistry, A Syllabus for Secondary Schools.
New York State Education Dept., Albany. Bureau of Secondary Curriculum Development.; State Univ. of New York, Albany.
Pub Date—79
Note—187p.; For related document, see ED 055 909
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC08 Plus Postage.
Descriptors—Atomic Structure, *Chemistry, *Course Content, Curriculum Development, *Curriculum Guides, Energy, *Science Courses, Science Curriculum, Scientific Concepts, Secondary Education, *Secondary School Science, *State Programs

Presented is a modern view of chemistry suitable for pupils with a wide range of skills and abilities. The outline of topics provides the unifying principles of chemistry together with related facts. The principles included in the outline are basic to man's understanding of his environment. The topical outline is divided into nine major units: Matter and Energy, Atomic Structure, Bonding, Periodic Table, Mathematics of Chemistry, Kinetics and Equilibrium, Acid-Base Theories, Redox and Electrochemistry, and Organic Chemistry. A tenth unit, Application of Principles of Reaction, is to be related to, and integrated into, other units as it applies. Each unit is subdivided into specific topics, each of which has additional material associated with it. Understandings and Fundamental Concepts outline the basic concepts, while Supplementary Information provides amplification and explanation of the basic concepts. (Author/HM)

ED 186 239 SE 030 566

Regents Chemistry Syllabus. Trial Draft.

New York State Education Dept., Albany. Bureau of General Education Curriculum Development.; State Univ. of New York, Albany.

Pub Date—Sep 79

Note—186p.; Not available in hard copy due to marginal legibility of original document. Best copy available.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Chemistry, *Curriculum Guides, Instructional Materials, *Science Curriculum, Science Education, Secondary Education, *Secondary School Science, *State Curriculum Guides

This syllabus presents material to be covered in chemistry for pupils of varying skills and abilities in New York public high schools. An outline of topics provides an overview of the principles, concepts, and applications included within the course and tested in the New York State Regents Examination. Twelve units of study are described. Material within each unit is organized into three subheadings: topics, understandings and fundamental concepts, and supplementary information. Unit 12 outlines topics representing minimum requirements for skills and activities in laboratory experiences. (CS)

ED 188 925 SE 031 437

How to Build a Low-Cost Spectroscope.

National Aeronautics and Space Administration, Washington, D.C.

Pub Date—[79]

Note—31p.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC02 Plus Postage.

Descriptors—*Chemistry, Color, Instructional Materials, *Light, Science Education, *Science Equipment, Secondary Education, Secondary School Science, *Spectroscopy

Instructions accompanied by illustrations for building a low-cost demonstration spectroscope are presented. Materials and tools are pictured and labeled. Cost is estimated at five dollars (in 1980) and twelve hours of work are required to build the spectroscope. (SA)

Secondary

Earth/Space/Meteorology/Oceanography

ED 028 097 SE 006 541
Linsky, Ronald B. Schnitger, Ronald L.
Marine Sciences Student Syllabus.
Orange County Board of Education, Santa Ana, Calif.
Pub Date Sep 68
Grant—OEG-3-7-703779-4257
Note—90p.
EDRS Price MF-$0.50 HC-$4.60
Descriptors—*Laboratory Techniques, Manuals, *Mobile Laboratories, *Oceanology, Science Activities, Science Equipment, *Secondary School Science

This manual was developed for students participating in the oceanology program offered on the Orange County's Marine Science Floating Laboratory. The program is experience-centered and provides for the students utilizing much of the same equipment used by professional oceanologists. The manual is divided into two sections: (1) "The Immediate Environment I-Physical Properties of the Oceans" and (2) "The Immediate Environment II-Biological Properities of the Oceans." Included for each section is background information and a discussion of techniques for studying specific properties of the oceans. Pictorial taxonomic keys, a glossary of terms, and other pertinent information are appended. (RS)

ED 032 236 SE 007 539
Activities in Science Related to Space.
National Aeronautics and Space Administration, Washington, D.C. Educational Programs Div.
Pub Date 68
Note—56p.
EDRS Price MF-$0.25 HC-$2.90
Descriptors—*Aerospace Technology, Astronomy, Elementary School Science, *Instructional Materials, Physical Sciences, *Science Activities, *Scientific Concepts, Secondary School Science
Identifiers—Educational Programs Division, National Aeronautics and Space Administration

Contained are a collection of science activities based upon forty-six scientific concepts related to space science. These activities are designed for junior high school science, but a much wider grade level range of use is possible. The booklet is primarily intended for teacher use. Each series of concept-oriented activities is independent of the others. The format consists of concept introduction, teacher information, and student activities. Application of the scientific concepts to aerospace technology are emphasized. (RR)

ED 040 047 SE 008 196
Thompson, Malcolm
Space Resources for Teachers, Space Science, A Guide Outlining Understandings, Fundamental Concepts, and Activities.
Columbia Univ., New York, N.Y.; National Aeronautics and Space Administration, New York, N. Y. Goddard Inst. for Space Studies.
Pub Date 69
Note—145p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (0-358-779, $2.00).
EDRS Price MF-$0.75 HC Not Available from EDRS.
Descriptors—*Aerospace Technology, Annotated Bibliographies, *Astronomy, *College Science, *Instructional Materials, Physical Sciences, Science Activities, *Secondary School Science, Teaching Guides

This instructional and resource guide is designed so that it may be used in the secondary school or in the first two years of college to present a series of units in space science, or to supplement existing science and mathematics courses. The guide consists of six units: (1) measurement, distance, and size in astronomy, (2) atoms, spectra, and stars, (3) atomic nuclei and stars, (4) the solar system, (5) the origin and evaluation of life, and (6) motion, rockets and gravity. Each unit is divided into the following parts: (a) a list of understandings that a student should have after completing study of the unit, (b) a topical outline of the material in the unit, with expositions, tables, demonstrations, and activities inserted when appropriate, (c) a list of sample questions, (d) problems and projects for further exploration, (e) audiovisual aids, (f) an annotated teacher bibliography and (g) an annotated student bibliography. Each of the units is basically self-contained. However, in general they require additional knowledge which may be obtained by a study of the earlier units, from the context of another course, or by a study of the material listed in the bibliographies. The material in the guide covers a range of difficulty levels, from grade nine through the first two years of college. (LC)

ED 042 622 SE 009 342
Forbes, Lynn And Others
An Oceanographic Field Course for the Eighth Grade.
Falmouth Public Schools, Mass.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Sep 69
Note—78p.
EDRS Price MF-$0.50 HC Not Available from EDRS.
Descriptors—*Curriculum, Ecology, General Science, *Instructional Materials, Laboratory Procedures, Marine Biology, *Oceanology, *Secondary School Science, *Teaching Guides
Identifiers—ESEA Title III

This manual contains a suggested Oceanographic Field Course designed as a supplement to an eighth grade science program. The three principle objectives of the course are: (1) to stimulate the interest of young students in the marine sciences; (2) to instruct students in the scientific method of field observation and laboratory investigation, and (3) to take advantage of the interdisciplinary nature of oceanography to teach the basic principles of general science. There are seven sections to the manual with suggested plans for teaching, and a suggested arrangement to accommodate the variable times in which they may be taught. Each section includes a discussion of the section topic, suggested bibliography, lesson plan, and field and laboratory procedures. Each section is concerned with sampling marine life and/or determining environmental conditions. This work was prepared under an ESEA Title III contract. [Not available in hardcopy due to marginal legibility of original document.] (HB)

ED 044 302 SE 010 124
Kittrell, F. W.
A Practical Guide to Water Quality Studies of Streams.
Department of the Interior, Washington, D. C. Federal Water Pollution Control Administration.
Report No—CWR-5
Pub Date Aug 69
Note—148p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Cat. No. 0-368-814, $0.70)
EDRS Price MF-$0.75 HC Not Available from EDRS.
Descriptors—Chemical Analysis, *Ecology, Environment, Laboratory Techniques, Reference Materials, *Sampling, *Water Pollution Control, *Water Resources

Reported are sampling methods that may be followed when performing stream studies. Sources of error and methods of their minimization are discussed. Because there is much variation within and between streams it is not possible to provide detailed definitive methods but alternatives are discussed. The selection of sampling sites and sampling procedures, precautions needed to prevent samples changing before analysis, the use of field laboratories, the use and interpretation of data from sewage plants, and procedures for collecting and analyzing wastes discharged into streams are considered, and the importance of studying the use of stream water are indicated. A list of sources of information and a discussion of data interpretation precede a guide to report writing. Detailed analytical procedures are not included but reference is made to the sources of standard methods. An appendix contains tables useful in data analysis. (AL)

ED 045 380 SE 009 857
Hershey, John T. And Others
A Curriculum Activities Guide to Water Pollution and Environmental Studies.
Tilton School, N.H.
Spons Agency—Department of the Interior, Washington, D.C. Federal Water Quality Administration.
Pub Date 4 Aug 70
Note—641p.
Available from—Philip Murphy, Tilton School, Tilton, N.H. 03276 (Est. pr. $5.00-$8.00)
EDRS Price MF-$2.50 HC Not Available from EDRS.
Descriptors—Conservation Education, Ecology, *Environmental Education, *Instructional Materials, Natural Resources, Outdoor Education, Pollution, *Secondary School Science, *Teaching Guides, *Water Resources

This activity oriented environmental guide is the result of cooperative efforts of high school teachers, students, scientists, and technicians. The activities are divided into four chapters: Hydrologic Cycle; Human Activities; Ecological Perspectives; and Social and Political Factors. Each activity contains seven parts: an introduction; questions regarding the activity; equipment; procedures; results obtained by using the study; limitations and problems encountered with the activity; and an annotated bibliography. There are seven appendices at the end of the guide. The appendix includes a discussion of water quality parameters, aids to implementation, suggestions regarding limitations and inconveniences, suggestions related to evaluation, a bibliography, a water pollution and environmental glossary, and comments regarding laboratory and field safety. (RH)

ED 045 411 SE 010 173
Campbell, K. C. And Others
Earth Science (A Process Approach), Section 1: The Water Cycle.
Edmonton Public School Board (Alberta).
Pub Date Jun 70
Note—97p.
EDRS Price MF-$0.50 HC-$4.95
Descriptors—*Earth Science, *Instructional Materials, Meteorology, Resource Materials, *Science Activities, *Secondary School Science, *Teaching Guides

Included is a collection of earth science laboratory activities, which may provide the junior or senior high school science teacher with ideas for activities in his program. The included 48 experiments are grouped into these areas: properties of matter; evaporation; atmospheric moisture and condensation; precipitation; moving water, subsurface water, material dissolved in water, solid water, and others. The booklet is designed so that the teacher's notes appear on the left page, and are adjacent to the suggested student notes on the right page. The student notes generally outline the activities under these main headings: Preparation, Experiment, Concepts, and Open-Endedness. Included are lists of earth science library books, reference books, films, filmstrips, and kits. (PR)

ED 046 715 SE 010 209
Beakley, John C. And Others
The Source Book of Marine Sciences.
Florida State Dept. of Education, Tallahassee. Div of Elementary and Secondary Education.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washing-

ton, D.C.
Pub Date 70
Note—153p.
Available from—Textbooks and Publications, Dept. of Education, Knott Bldg., Tallahassee, Fla. 32304 ($1.25)
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Environmental Education, *Instructional Materials, Laboratory Experiments, Marine Biology, *Oceanology, Resource Materials, *Science Activities, *Secondary School Science, Teaching Guides
Identifiers—ESEA Title III

Included is a teachers resource collection of 42 marine science activities for high school students. Both the biological and the physical factors of the marine environment are investigated, including the study of tides, local currents, microscope measuring, beaches, turbidity, sea water solids, pH, and salinity, marine bacteriology, microbiology, bioluminescence, taxonomy, plankton, sponges and speculation, pelecypod gill, crustacea, sea urchin development, salinity tolerances, and other topics. Most activities are performed in the laboratory, but sample gathering requires access to ocean beaches. Activities are generally presented in the format--separate introductory statements to the teacher and to the student, problem statement, materials, procedure, and questions. The source book could serve as a laboratory manual. This work was prepared under an ESEA Title III contract. (PR)

ED 047 939 SE 009 811
Give Earth a Chance Series. Dirty Air, Trash Is Taking Over, Sounds and Silence, Pesticides Are Perilous, Tragedy in the Laundromat, Troublesome Tail Pipes.
Minneapolis Independent School District 275, Minn.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [70]
Note—136p.
Available from—ESC Distributing Co., P.O. Box 27144, Golden Valley, Minn. 55427 (Single copy $0.75, Set $4.00)
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—Air Pollution Control, Community Problems, *Elementary School Science, *Environment, Environmental Education, *Instructional Materials, *Pollution, Science Activities, Water Pollution Control
Identifiers—ESEA Title III

These six booklets in the "Give Earth a Chance Series" are titled, "Dirty Air," "Trash is Taking Over," "Sounds and Silence," "Pesticides are Perilous," "Tragedy in the Laundromat," and "Troublesome Tail Pipes." The booklets are suitable for elementary use, and are intended to stimulate discussion and activities related to various forms of pollution. Each booklet begins with a story in which the main characters encounter a pollution problem; an investigation or study to evaluate a problem in the community follows. The stories involve the characters in actual field work, collecting and analyzing data in such studies as air pollution measurement, detergent studies, trash measurement, etc. The stories serve as a model for actual class activities, and many questions and problems are left unexplored, but are presented to stimulate further investigation. Many suggestions are made for student activities. This work was prepared under an ESEA Title III contract. (PR)

ED 052 004 SE 010 157
DISCUS Ninth Grade, Earth Science.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date Sep 69
Note—149p.
Available from—DISCUS, 1011 Gilmore Street, Jacksonville, Florida 32204
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Disadvantaged Youth, *Earth Science, *Instructional Materials, Laboratory Procedures, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the first volume of a two volume, one year program in earth science, and contains these four units and activities: Earth Materials, 8 activities; Weather, 10 activities; Water, 4 activities; and Water Cycle, 6 activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally includes a list of required equipment for small group activities, introduction and procedures, and fill-in questions relating to the completed activity. The volume begins with extensive "guidelines for creating an appropriate classroom environment." (PR)

ED 052 005 SE 010 158
DISCUS Ninth Grade, Earth Science, Part Two.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date Jan 70
Note—171p.; Revised January 23, 1970
Available from—DISCUS, 1011 Gilmore Street, Jacksonville, Florida 32204
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Disadvantaged Youth, *Earth Science, *Instructional Materials, Laboratory Procedures, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the second volume of a two volume, one year program in earth science, and contains these five units and activities: Rock Cycle, 12 activities; Minerals and Crystals, 6 activities; Weathering and Erosion, 4 activities; Earth and Space, 16 activities; and Oceanography, 8 activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally includes a list of required equipment for small group activities, introduction and procedures, and fill-in questions relating to the completed activity. (PR)

ED 054 118 SP 007 311
Beakley, John C. And Others
The Source Book of Marine Sciences.
Florida State Dept. of Education, Tallahassee. Div. of Curriculum and Instruction.
Pub Date 70
Note—152p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Biology, *Curriculum Guides, *High School Curriculum, *Marine Biology, *Science Curriculum

GRADES OR AGES: Not specified. SUBJECT MATTER: Marine sciences. ORGANIZATION AND PHYSICAL APPEARANCE: The guide has 39 chapters, each set out in a similar pattern but with minor variations: 1) to the teacher, 2) to the student, 3) problem or purpose, 4) materials, 5) procedure, 6) questions for consideration, and 7) references. Major topics covered include saltwater aquaria, the nature of tides, use of a microscope, beach analysis, the salinity of sea water, studies of a variety of sea creatures, the analysis of marine populations, and the preparation of herbarium mounts. The guide is illustrated with drawings and some photographs. It is printed and perfect-bound with a soft cover. OBJECTIVES AND ACTIVITIES: The objectives for each lesson are given in the paragraphs on "purpose." The greater part of each chapter covers student activities. INSTRUCTIONAL MATERIALS: Equipment needed for the various activities, together with reference material, is listed in each chapter. There are separate lists of periodicals, newsletters and journals, and films. (MBM)

ED 058 455 VT 014 596
Exploring in Aerospace Rocketry. An Introduction to the Fundamentals of Rocketry.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Report No—NASA-EP-88
Pub Date 71
Note—366p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 3300-0394; NAS1.19:88, $3.25)
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Aerospace Industry, *Aerospace Technology, *Curriculum Guides, Illustrations, *Industrial Education, Instructional Materials, Occupational Guidance, *Resource Materials, *Textbooks
Identifiers—*Rocketry

This curriculum guide is based on 2 years of lectures and projects of a contemporary, special-interest aerospace program for promising students, ages 15-19. The program uses technical lectures, project activities and field trips to introduce students to the real engineering world of pioneering aerospace achievement, and the variety of skills and careers it involves. This book can be used as a curriculum resource for high school and college teachers, and may be helpful to curriculum committees and textbook writers. Teachers in various disciplines can use selected chapters to enrich or supplement regular courses, including applied mathematics, physics, chemistry and biology. With modification, some of the material could be useful industrial arts and vocational education courses. The 22 chapters are supplemented with numerous illustrations, photographs, charts, and line drawings. A related document is available as VT 014 597. (CD)

ED 058 456 VT 014 597
Exploring in Aeronautics. An Introduction to Aeronautical Sciences.
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
Report No—NASA-EP-89
Pub Date 71
Note—398p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 3300-0395; NAS1.19:89, $3.50)
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Aerospace Industry, *Aerospace Technology, *Curriculum Guides, Illustrations, *Industrial Education, Instructional Materials, *Occupational Guidance, *Textbooks
Identifiers—*Aeronatics

This curriculum guide is based on a year of lectures and projects of a contemporary special-interest Explorer program intended to provide career guidance and motivation for promising students interested in aerospace engineering and scientific professions. The adult-oriented program avoids technicality and rigorous mathematics and stresses real life involvement through project activity and teamwork. Teachers in high schools and colleges will find this a useful curriculum resource, with many topics in various disciplines which can supplement regular courses. Curriculum committees, textbook writers and hobbyists will also find it relevant. The materials may be used at college level for introductory courses, or modified for use with vocationally oriented high school student groups. Seventeen chapters are supplemented with photographs, charts, and line drawings. A related document is available as VT 014 596. (CD)

ED 059 866 SE 012 306
Lawrence, Richard M.
Space Resources for Teachers: Chemistry; Including Suggestions for Classroom Activities and Laboratory Experiments.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-87
Pub Date Feb 71
Note—221p.
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 ($2.50)
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Aerospace Education, *Aerospace

Technology, *Chemistry, Resource Materials, *Science Activities, *Secondary School Science, Space Sciences, Teaching Guides

Identifiers—NASA

This publication is composed of 10 units, each based on an area of space science and technology in which chemistry plays an important role. Each resource unit can be used independently of the others and materials can be selected from within a unit. The materials range in difficulty from the junior high level of understanding to those that will appeal to the advanced student seeking challenging research activities. The 10 resource units are arranged in a sequence of topics similar to many general chemistry textbooks. Unit topics include: cabin atmospheres in space vehicles, life-support systems, chemical rocket propellants, electrochemical cells for space power, rates of high-temperature reactions associated with space vehicles, space vehicle lubrication, optical coatings for temperature control of space vehicles, ablative materials for high-temperature thermal protection, chemical evolution, and detection of extraterrestrial life. Each unit consists of three parts: a brief monograph providing background information; several activities for demonstrations, experiments, or projects; and a list of literature sources. For some units, a list of related films is also included. (Author/PR)

ED 061 060 **SE 013 380**

Godfrey, Paul J. Hon, Will

Dune Detective, Using Ecological Studies to Reconstruct Events Which Shaped a Barrier Island.

Carteret County Public Schools, Beaufort, N.C.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 70

Note—34p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Earth Science, Ecology, Environmental Education, *Instructional Materials, Learning Activities, *Oceanology, *Secondary School Science, *Student Research, Water Resources

Identifiers—ESEA Title III

This publication is designed for use as part of a curriculum series developed by the Regional Marine Science Project. Students in grades 11 and 12 are exposed to research methods through a series of field exercises guiding investigators in reconstructing the events which have shaped the natural communities of a barrier beach. Background information, field equipment, field assignments, procedures, results and discussion ideas are provided for six exercises: dune survey, washover–physical aspects, washover--ecological succession, maritime forest profile, salt marsh survey–mapping, and salt marsh survey--elevations. Numerous line drawings, diagrams, charts, and photos supplement the narrative material. This work was prepared under an ESEA Title III contract. (BL)

ED 065 293 **SE 014 141**

Demonstration Aids for Aviation Education [National Aviation Education Workshop].

Federal Aviation Administration, Washington, D.C.

Pub Date 70

Note—36p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Aerospace Education, *Demonstrations (Educational), *Elementary School Students, *Instructional Aids, Instructional Materials, Science Activities, *Teaching Guides

This manual, compiled by a Committee of the Curriculum Laboratory of the Civil Air Patrol, contains 105 demonstrations and activities which can be used to introduce the elementary student to the properties of air as related to aviation, what makes airplanes fly, and the role of weather in aviation. (CP)

ED 070 766 **SP 007 343**

Seventh Grade Interdisciplinary Packet (Science-Social Studies).

Madison Public Schools, Wis. Dept. of Curriculum Development.

Pub Date 70

Note—79p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Curriculum Guides, Grade 7, *Interdisciplinary Approach, *Science Curriculum, *Science Education, *Social Studies

GRADES OR AGES: Grade 7. SUBJECT MATTER: Science and Social Studies. ORGANIZATION AND PHYSICAL APPEARANCE: This guide presents a series of earth sciences units which would have interdisciplinary potential specifically in the area of social studies. Introductory material includes a rationale, evaluation procedures, 44 "key" environmental concepts, and the interdisciplinary scope and sequence. A trio of organizational themes form the basis for this guide: man's use of communication systems; a descriptive look at the natural environment; and the interaction between man and his environment. Four science units presented include mapping, earth processes, weather, and astronomy. Each unit provides concepts, objectives, activities and evaluation sheets. The guide is lithographed and spiral bound with a hard cover. OBJECTIVES AND ACTIVITIES: Objectives and detailed activities are provided for in each unit. INSTRUCTIONAL MATERIALS: Charts and other materials are listed under Suggested Materials List. STUDENT ASSESSMENT: Provision is made for student evaluation. (MJM)

ED 077 655 **SE 015 498**

Information for Teachers (Including Classroom Activities), Skylab Student Project.

National Aeronautics and Space Administration, Washington, D.C.

Report No—EP-106

Pub Date Nov 72

Note—45p.

Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (no price quoted)

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Aerospace Education, Aerospace Technology, Instructional Materials, Science Activities, *Science Education, *Space, *Student Projects, *Student Research, Student Science Interests

This program is intended to directly involve the educational community in space experiments, many of which can be related to existing curricula. Included in this first packet are: 1) a brief description of the Skylab Program and the National Science Teachers Association-National Aeronautics and Space Administration (NSTA-NASA) Skylab Student Program; 2) description of the experiment selection process for flight; 3) description of experiment performance; 3) summaries of each of the 25 national winning student experiments; 4) samples of the student proposals as submitted by the students; 5) related classroom activities. The descriptive portion of the booklet gives an impression of the working of "-big" science as opposed to the kind of laboratory work most students are aware of. The experiment descriptions and classroom activities in some cases show the necessary integration of a number of sciences and the inclusion of engineering in carrying out projects in the complex environment of a space laboratory. (Author/EB)

ED 079 025 **SE 014 877**

Worthington, Charles

Applied Meteorology, Science (Experimental): 5343.06.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—19p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Behavioral Objectives, *Earth Science, Instruction, Instructional Materials, *Meteorology, Physical Sciences, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction was designed to introduce the student to the elements of weather through a study of the instruments used to measure the elements and the U.S. daily weather map. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, field trips, and topics for student projects, reports, and additional activities. Also listed are relevant films, transparencies, slides, and filmstrips available from the Dade County Audiovisual Center. Reference books and teaching aids are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 080 361 **SE 016 614**

Hershey, John T., Ed. And Others

A Curriculum Activities Guide to Water Quality Equipment and Environmental Studies.

Project KARE, Blue Bell, Pa.

Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.

Pub Date 73

Grant—OEG-0-72-5105

Note—182p.

Available from—Institute for Environmental Education, 8911 Euclid Avenue, Cleveland, Ohio 44106

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Construction (Process), Curriculum Guides,*Elementary Grades, *Environmental Education, *Equipment, Instructional Materials, Learning Activities, *Measurement Instruments, Secondary Grades, Testing, *Water Resources

This book is the third in a series of four books emphasizing student-oriented problem solving related to environmental matters. In properly conducted environmental investigations, it is felt students will perceive the need to extend their senses by using instruments. The instrumentation as presented in this guide should aid students in this respect. Chapter 1 offers construction plans for 23 pieces of water quality testing equipment. Included for each are an introduction to the item, materials and tools needed, procedure for construction, directions for using it, problems encountered, and a bibliography. Basic, intermediate, and advanced water quality kits and systems which can investigate four major water quality parameters--physical, chemical, macrobiological, and microbiological factors--are discussed in Chapter 2. Water quality equipment is listed in Chapter 3 for measuring devices, scientific equipment, tools, resource materials, supplies, containers, and glass and miscellaneous items. Each table identifies the item, use area (biology, chemistry, physics), topic area, age range of user, and local source to obtain it. How and where to get needed items are dealt with in the final chapter. Related documents are SE 016 524 and SE 016 525. (BL)

ED 082 978 **SE 016 651**

Nurnberger, Robert G.

An Air Pollution Resource Manual for Junior High School and High School Teachers.

State Univ. of New York, Albany. Research Foundation.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date Aug 71

Note—360p.

EDRS Price MF-$0.65 HC-$13.16

Descriptors—*Air Pollution Control, *Environmental Education, Humanities, Instructional Materials, Lesson Plans, Manuals, Resource Units, Sciences, *Secondary Grades, Social Sciences, *Teaching Guides

This manual was conceived and developed by a team of teachers and subject matter experts from diverse areas and planned as a resource for teachers at the middle school and high school levels who are concerned with air pollution. Not intended as a syllabus or student text, it offers information and sample exercises which may be incorporated into a variety of subject areas together with data, charts, and illustrations which may be useful in classroom situations. The manual is essentially in four sections (1) basic background in the scientific and societal origins of the problem of air pollution (scientific--composition and structure of the atmosphere, thermal energy and its effects, physical processes, local topographic effects, effects of cities, and interacting atmospheric subsystems, societal--historical perspectives, system of relations among individuals, long-range consequences, change and adaptation, and impetus for solutions), (2) treatment of the nature and scope of man's activities which contribute to air pollution, including primary industries, process industries, transportation, service industries, governmental activities, community activities, and recreational activities; (3) sample exercises in the sciences, social ciences, and humanities; and (4) bibliography. Each section is treated comprehensively. (BL)

ED 083 045 SE 016 926

From Here, Where? A Space Mathematics Supplement for Secondary Levels.

National Aeronautics and Space Administration, Washington, D.C.

Pub Date 65

Note—184p.; Prepared in cooperation with the U.S. Office of Education

Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 ($1.25)

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Curriculum, Instruction, *Instructional Materials, Integrated Activities, *Interdisciplinary Approach, *Mathematical Applications, Mathematics Education, Problem Solving, *Science Education, *Secondary School Mathematics, Space Sciences, Teaching Techniques

A number of space science resource materials and activities are developed into a useful format for classroom presentation. The application of mathematical properties in making scientific discoveries is the major emphasis. Each section has a discussion centered on the men and history behind the discovery of physical laws and phenomena relevant to space flight and exploration. The discussion provides interest and stimulation for the suggested experiments and problems. This document provides a valuable supplement for use with secondary school topics such as ratios, logarithms, vectors, analytic geometry and trigonometry. (JP)

ED 084 081 SE 014 889

Geomorphology, Science (Experimental): 5343.09.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—17p.; An Authorized Course of Instruction for the Quinmester Program

DRS Price MF-$0.65 HC-$3.29

Descriptors—*Earth Science, *Instruction, Objectives, Science Education, *Secondary School Science, Seismology, Student Projects, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

Performance objectives are stated for this secondary school instructional unit concerned with aspects of earth science with emphases on the internal and external forces that bring about changes in the earth's crust. Lists of films and state-adopted and other texts are presented. Included are a course outline summarizing the unit content, numerous suggestions for experiments, demonstrations, and activities in laboratory and field, and lists of possible individual projects and discussion questions. A master sheet showing the relationship of each suggested activity to the objectives of the unit is appended in this booklet. (CC)

ED 086 837 95 CE 000 870

Kenston Aerospace: Title III ESEA Project.

Kenston Local School District, Chagrin Falls, Ohio.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date [73]

Note—117p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Aerospace Education, *Course Descriptions, Curriculum Guides, Grade 10, Grade 11, Grade 12, Independent Study, *Program Descriptions, *Program Evaluation, Skill Development, Student Evaluation, Vocational Aptitude, Vocational Counseling, Vocational Interests

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

The objectives of a three-year comprehensive aerospace education program at Kenston High School, Chagrin Falls, Ohio, funded under Title III ESEA, were to provide marketable skills for non-College-bound students as well as counseling for the student planning on college or technical school education in the aviation field. Students also were taught skills of other disciplines such as math, geography, cartography, and science under real job-training conditions. The entire three-year program in aerospace education included three year-long courses, totaling three units of high school credit and was made available to all interested tenth, eleventh, and twelfth grade students. The program was supplemented with speakers, audio-visuals, and field trips, students in each course were required to do an independent study project. An evaluation of the project reflects aviation student profiles, class attendance, course interest, future vocational goals of students, and interest-aptitude survey. Other aspects covered are the impact of Title III, cooperating agencies, information dissemination, and costs. More than half of this document is devoted to appendixes describing student aviation projects and reports, curriculum guides of courses, students survey, photographs, evaluation samples (OVIS, Strong, and GATB), and phase-in report. (Author/EA)

ED 089 037 CE 001 083

Earth and Life Science: Eighth Grade. Curriculum Guide.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date 72

Note—215p.

EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE

Descriptors—Audiovisual Aids, Bibliographies, *Biological Sciences, *Career Education, *Curriculum Guides, *Earth Science, Educational Objectives, Educational Resources, *Grade 8, Instructional Materials, Occupational Information, Performance Specifications, Resource Materials, Teaching Methods, Units of Study (Subject Fields)

Identifiers—Texas

The guide is arranged in vertical columns relating curriculum concepts in earth science to curriculum performance objectives, career concepts and career performance objectives, suggested teaching methods, and resource materials. The course for eighth graders attempts to place the curriculum concepts in order of increasing difficulty. Occupational information for 63 different occupations includes job duties, educational requirements, salary range, and employment opportunities. An additional fifteen occupations in the earth sciences are listed. Space is provided for teachers' notes which will be useful when the guide is revised. Appendixes include diagrams, keys to the diagrams, mineral classification tables, audio-visual source information, additional sources of career information, selected references, periodicals for career information, and supplementary addresses. (AG)

ED 090 029 SE 017 609

Reese, Sandra Kay

Atmosphere, Science (Experimental): 5343.08.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—21p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—Behavioral Objectives, *Earth Science, Instruction, *Instructional Materials, *Meteorology, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction deals with a study of the general atmosphere by layers with an emphasis on physical characteristics. The formation of layers in the atmosphere and the energy relationships that exist between them are also discussed. No requisites for prior course work, experience, or courses to be taken concurrently are required for enrollment. The booklet lists the relevant state-adopted texts and states the performance objectives for each unit. It provides an outline of the course content and suggests experiments, demonstrations, guest speakers, field trips, innovative activities, and topics for student projects, discussion questions, and reports. Also listed are relevant films available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 090 032 SE 017 619

Gato, Jeannette

Mineralogy, Science (Experimental): 5343.02.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—25p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Behavioral Objectives, *Earth Science, *Geology, Instruction, *Instructional Materials, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction deals with the examination of minerals in the earth's crust and their formation into rocks. No prerequisites are required for enrollment in the course. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, teacher directed activities, innovative activities, field trips, guest speakers, and topics for student projects discussion questions, and reports. Also listed are relevant films, slides, and filmstrips available from the Dade County Audiovisual Center. Reference books, models, and sources for supplies are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 091 153 SE 016 464

Skylab Experiments, Volume I, Physical Science, Solar Astronomy.

National Aeronautics and Space Administration, Washington, D.C.

Report No—EP-110

Pub Date May 73

Note—81p.; For related documents, see SE 016 465, SE 016 991, SE 017 106, and SE 017 788-790

Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402

EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE

Descriptors—*Aerospace Technology, *Astronomy, Demonstrations (Educational), *Instructional Materials, *Interdisciplinary Approach, Science Activities, Science Education, *Science Experiments, Science Materials, Secondary School Science

Identifiers—NASA, *Skylab Education Program

Up-to-date knowledge about Skylab experiments is presented for the purpose of informing high school teachers about scientific research performed in orbit and enabling them to broaden their scope of material selection. The first volume is concerned with the solar astronomy program. The related fields are physics, electronics, biology, chemistry, and photography, especially dealing with electromagnetic spectra, atomic structures, x-ray absorption, radiation, and kinetic theory. The content includes discussions of basic scientific background, a description of the sun and of the energy characteristics associated with each zone, and experiments with hydrogen-alpha telescopes, white light coronagraphy, extreme ultraviolet spectrograph and spectroheliograph, scanning polychromator, x-ray spectrographic camera, solar photography, and x-ray telescopes. Related curriculum topics and classroom demonstrations and activities are provided in detail. (CC)

ED 091 154 SE 016 465

Skylab Experiments, Volume 2, Remote Sensing of Earth Resources.

National Aeronautics and Space Administration, Washington, D.C.

Report No—EP-111

Pub Date May 73

Note—103p.; For related documents, see SE 016 464, SE 016 991, SE 017 106, and SE 017 788-790

Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402

EDRS Price MF-$0.75 HC-$5.40 PLUS

POSTAGE
Descriptors—*Aerospace Technology, *Earth Science, *Instructional Materials, Science Activities, Science Education, *Science Equipment, *Science Experiments, Science Materials, Secondary School Science
Identifiers—NASA, *Skylab Education Program

Up-to-date knowledge about Skylab experiments is presented for the purpose of informing high school teachers about scientific research performed in orbit and enabling them to broaden their scope of material selection. The second volume emphasizes the sensing of earth resources. The content includes an introduction to the concept and historical significance of remote sensing, a discussion of major scientific considerations involved in remotely sensing the earth, and descriptions of experiments with multispectral photographic facility, infrared spectrometers, multispectral scanners, microwave scatterometers and altimeters, and L-band radiometers. Experiment background, scientific objectives, application of equipment, and data output are explained in each description. Related curriculum activities, suggested classroom demonstrations, and an outline for the relationships between experimental data and instructional materials are presented. Included in the appendices are additional remote sensor information, a glossary of terms used in this volume, and a selected bibliography. (CC)

ED 091 157 SE 016 991
Skylab Experiments, Volume 4, Life Sciences.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-113
Pub Date May 73
Note—104p.; For related documents, see SE 016 464 and 465, SE 017 106, and SE 017 788-790
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Aerospace Technology, *Biological Sciences, Biology, *Instructional Materials, *Science Activities, Science Education, *Science Materials, Secondary School Science
Identifiers—NASA, *Skylab Education Program

Basic knowledge about Skylab experiments is presented in this book, one of a series, for the purpose of informing high school teachers about scientific research performed in orbit and enabling the teachers to broaden their basis for material selection. This fourth volume is concerned with experiments designed to improve man's understanding of himself and his physiological functions and needs, and studies on the biochemical and biophysical behavior of lower organisms and single human cells in the weightless environment of space. The content includes topics relating to mineral balance, bioassay of body fluids, bone mineral measurement, cytogenic studies, man's immunity during and following exposure to space flight, blood volume and red cell life span, red blood cell-metabolism, hematologic effects, inflight lower body negative pressure, vectorcardiogram, metabolic activity, human vestibular function, sleep monitoring, effects of zero gravity on single human cells, and experiments with pocket mice and vinegar gnats. Experiment background, scientific objectives, relationships between the Skylab investigations and high school topics, and suggestions for classroom activities are provided. Included is a glossary of terms. (CC)

ED 091 164 SE 017 106
Skylab Experiments, Volume 6, Mechanics.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-115
Pub Date May 73
Note—40p., For related documents, see SE 015 464 and 465, SE 016 991, and SE 017 788-790
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—*Aerospace Technology, *Demonstrations (Educational), *Instructional Materials, *Mechanics (Physics), Physics, Science Activities, Science Education, Science Materials, Secondary School Science
Identifiers—NASA, *Skylab Education Program

Volume 6, one of a series of booklets designed to acquaint teachers with the Skylab Program, is focused on mechanics. Introductory material provides background information on Skylab and its related education program. Section 1 of the booklet presents relevant physics content concerning the concept of mechanics. Section 2 contains a discussion of astronaut mobility aids. Section 3 focuses on mass measurement devices while section 4 is concerned with space guidance and crew/vehicle disturbances. All four sections contain specific background information concerning the topic of the particular section, experiment objectives and data from the Skylab Program, related curriculum topics, and ideas for classroom demonstrations. Section 5 consists of a selected bibliography. (PEB)

ED 091 215 SE 017 788
Skylab Experiments, Volume 3, Materials Science.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-112
Pub Date May 73
Note—60p.; For related documents, see SE 016 464 and 465, SE 016 991, SE 017 106, and SE 017 789 and 790
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Aerospace Technology, *Demonstrations (Educational), *Instructional Materials, Metals, Science Activities, Science Education, Science Materials, *Secondary School Science, Semiconductor Devices, *Supplementary Textbooks
Identifiers—NASA, *Skylab Education Program

Basic knowledge about Skylab experiments is presented in this book, one of a series, for the purpose of informing high school teachers about scientific research performed in orbit and enabling the teachers to broaden their basis for material selection. This third volume is concerned with the effect of a weightless environment on melting and resolidification of metals and semiconductor crystals and on combustion of solid flammable materials. The first section provides an introduction to crystal growth and a unifying background to the experiments. The second section is related to experiments on gallium arsenide crystal growth, vapor growth of IV-VI compounds, immiscible alloy compositions, radioactive tracer diffusion, microsegregation in germanium, growth of spherical crystal, whisker and reinforced composites, indirum antimonide crystals, mixed III-V crystal growth, halide eutectecs, silver grids melted in space, aluminum-copper eutectic, and classrooom demonstrations. The third section discusses zero gravity flammability, metals melting experiment, and exothermic brazing experiments. A description of the Materials Processing Facility is given in the fourth section. Materials are suggested to serve as an aid in developing future curriculum supplement materials. Included are a glossary and a bibliography. (CC)

ED 091 216 SE 017 789
Skylab Experiments, Volume 5, Astronomy and Space Physics.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-114
Pub Date May 73
Note—86p., For related documents, see SE 016 464 and 465, SE 016 991, SE 017 106, SE 017 788, and SE 017 790
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Aerospace Technology, *Astronomy, *Instructional Materials, Pollution, Radiation, *Science Activities, Science Education, *Science Materials, Secondary School Science, Space Sciences
Identifiers—NASA, *Skylab Education Program

Basic knowledge about Skylab experiments is presented in this book, one of a series, for the purpose of informing high school teachers about scientific research performed in orbit and enabling the teachers to broaden their basis for material selection. This fifth volume is concerned with studies of our own and other galaxies and effects of solar radiation on Earth's atmosphere. The topics include the solar system, cosmic ray studies, stellar astronomy, spacecraft in space environment, radiation in spacecraft, ultraviolet airglow horizon photography, gegenschein/zodiacal light, particle collection, lunar libration clouds, objects within Mercury's orbit, x-rays from Jupiter, magnetospheric particle composition, cosmic ray nuclear emulsion, transuranic cosmic rays, neutron analysis, ultraviolet stellar astronomy and panorama, galactic x-ray mapping, spectrography of selected quasars, pulsars in the ultraviolet wavelengths, x-ray content in association with stellar, spectral classes, and contamination measurements. Experiment background, scientific objectives, relationships between the Skylab investigations and high school topics, and suggestions for classroom activities are provided. Included is a glossary of terms. (CC)

ED 091 217 SE 017 790
Skylab Experiments, Volume 7, Living and Working in Space.
National Aeronautics and Space Administration, Washington, D.C.
Report No—EP-116
Pub Date May 73
Note—51p., For related documents, see SE 016 464 and 465, SE 016 991, SE 017 106, and SE 017 788 and 789.
Available from—Superintendent of Documents, Government Printing Office, Washington, D.C. 20402
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Aerospace Technology, *Human Engineering, *Instructional Materials, Laboratory Experiments, Laboratory Procedures, Science Activities, Science Education, *Science Experiments, Secondary School Science, *Space Sciences
Identifiers—NASA, *Skylab Education Program

Basic knowledge about Skylab experiments is presented in this book for the purpose of informing high school teachers about scientific research performed in orbit and enabling the teachers to broaden their scope of material selection. The seventh volume deals with the ability of the Skylab crew to live and work effectively in space. The content is divided into three sections. The first section is concerned with the methods and techniques of human engineering used to design work spaces, requirements, and tools. The second section is related to performance in a weightless environment, and the third is related to living in space and inflight aerosol analysis. Experiment backgrounds, experimental procedures, scientific objectives, and types of data output are discussed in each section. Student experiments are suggested for their application to classroom activities. Included are a glossary and a selected bibliography. (CC)

ED 094 956 SE 016 611
Bolles, William H. And Others
Earth and Space Science. A Guide for Secondary Teachers.
Pennsylvania State Dept. of Education, Harrisburg. Bureau of Curriculum Services.
Pub Date 73
Note—200p.
EDRS Price MF-$0.75 HC-$9.00 PLUS POSTAGE
Descriptors—Aerospace Education, *Astronomy, *Curriculum Guides, *Earth Science, Geology, Laboratory Experiments, Oceanology, Science Activities, Science Education, *Secondary School Science
Identifiers—Pennsylvania

Designed for use in Pennsylvania secondary school science classes, this guide is intended to provide fundamental information in each of the various disciplines of the earth sciences. Some of the material contained in the guide is intended as background material for teachers. Five units are presented: The Earth, The Oceans, The Space Environment, The Atmosphere, and The Exploration of Space. The course is organized so that students proceed from the familiar, everyday world to the atmosphere and the space environment. Teaching geology in the fall takes advantage of weather conditions which permit field study. The purpose of the Earth and Space Science course is to encourage student behaviors which will be indicative of a broad understanding of man's physical environment of earth and space as well as an awareness of the consequences which could result from changes which man may effect. (PEB)

ED 096 124 SE 018 025

Reeder, R. P.

Sky Study.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—32p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—*Autoinstructional Programs, Behavioral Objectives, *Earth Science, *General Science, *Middle Schools, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)

Identifiers—*Del Mod System

This autoinstructional unit deals with the study of stars, constellations, and planets as part of a General Science and/or Earth Science program for students in high or middle school. Twelve behavioral objectives are identified. The equipment needed, the time suggested as adequate, and a sample of a final test that can be administered are included in the monograph. The script uses slides and an accompanying worksheet to facilitate the learning experience. A bibliography of four references is given. (EB)

ED 097 214 SE 018 221

Geology and Our Environment. Environmental Education Curriculum. Revised.

Topeka Public Schools, Kans.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Jun 74

Note—68p.; Best copy available; Occasional marginal legibility

EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE

Descriptors—Conservation Education, *Curriculum Guides, *Earth Science, *Environmental Education, *Geology, Instruction, Instructional Materials, Natural Resources, *Secondary School Science, Soil Science

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Rocks, and the soil formed from rock, play a major role in determining such particulars as the type of crops that can be grown in a specific area and the type of housing that can be constructed. Also, rocks may supply fuel and building materials, and provide information about the history of an area. This unit is constructed to expose secondary students to the forces that have determined the topography of an area, data on and field experience in fossil collecting, variance of rocks and fossils in different areas and how this information affects the city dweller's life through such illustrative examples as zoning decisions and considerations in purchasing a home. Teaching aid materials include behavioral objectives of the unit, a suggested time line, suggested methodologies, lists of appropriate films and filmstrips, and suggested evaluative instruments. (MLB)

ED 100 663 88 SE 018 354

Earth Science, Environmental Education Guide.

Project I-C-E, Green Bay, Wis.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Education, Madison.

Pub Date [74]

Note—33p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Conservation Education, *Earth Science, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Outdoor Education, *Science Education, *Secondary Education, *Teaching Guides

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, *Project I C E

This earth science guide, for use at the secondary level, is one of a series of guides, K-12, that were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design, containing a series of episodes (minilessons) that focus on student-centered activities allowing the student to make observations, collect data, interpret results, and draw conclusions. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or in different subject areas. This guide focuses on aspects such as climatic ecosystems, land use, and atmosphere. Most of the 12 concepts are covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 107 200 IR 001 638

Arons, Arnold Bork, Alfred

Two New Graphic Computer Dialogs for Teachers.

California Univ., Irvine. Physics Computer Development Project.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 5 Mar 75

Note—13p.

EDRS Price MF-$0.76 HC-$1.58 PLUS POSTAGE

Descriptors—Astronomy, *Computer Assisted Instruction, *Computer Graphics, Computer Programs, Elementary School Teachers, High School Students, Inservice Teacher Education, Material Development, Science Education, Science Instruction, Secondary School Teachers

Identifiers—Interactive Systems, LUNA, TERRA

A pair of interactive computer-student dialogs developed for use primarily with elementary and high school teachers are described. The dialogs use graphic facilities for teaching about the sky as seen from the earth and about the phases of the moon. The primary aim is for the teachers to understand the nature of a scientific model, in this case the model of the phases of the moon, through a Socratic interaction with the computer. The dialogs are also being used by other university students. (Author/SK)

ED 111 610 SE 017 447

The Aerospace Environment. Aerospace Education I. Instructor Handbook.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date Sep 72

Note—44p.; For the accompanying textbook, see SE 017 446

EDRS Price MF-$0.76 HC-$1.95 Plus Postage

Descriptors—*Aerospace Education, Aerospace Technology, *Astronomy, Aviation Technology, Course Organization, Curriculum Guides, Environment, *Instructional Materials, *Meteorology, National Defense, *Physical Sciences, Secondary Education, Teaching Guides, Unit Plan

Identifiers—*Air Force Junior ROTC

This publication provides guidelines for teachers using the textbook entitled "Aerospace Environment," published in the Aerospace Education I series. Major categories included in each chapter are objectives, behavioral objectives, suggested outline, orientation, suggested key points, instructional aids, projects, and further reading. Background materials for major concepts stressed are included. Page references corresponding to the textbook are given where appropriate. A blank sheet is included after each chapter for recording teacher ideas. (PS)

ED 111 611 SE 017 448

Coard, E. A.

Spacecraft and their Boosters. Aerospace Education I.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 72

Note—200p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 449

EDRS Price MF-$0.76 HC-$9.51 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, *Astronomy, Aviation Technology, Energy, *Instructional Materials, National Defense, *Physical Sciences, Secondary Education, Textbooks

Identifiers—Air Force Junior ROTC, *Spacecraft

This book, one in the series on Aerospace Education I, provides a description of some of the discoveries that spacecraft have made possible and of the experience that American astronauts have had in piloting spacecraft. The basic principles behind the operation of spacecraft and their boosters are explained. Descriptions are also included on unmanned and manned spacecraft. Brief mention is made of space stations, reusable space vehicles, and spacecraft fitted with specialized equipment for planetary exploration. The book is designed for use in the Air Force Junior ROTC program. (PS)

ED 111 613 SE 017 450

Mickey, V. V.

Aerospace Community. Aerospace Education I.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 73

Note—130p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 451

EDRS Price MF-$0.76 HC-$6.97 Plus Postage

Descriptors—*Aerospace Education, Aerospace Technology, Aviation Technology, *Career Opportunities, *Instructional Materials, *Military Schools, National Defense, *Physical Sciences, Secondary Education, Textbooks

Identifiers—*Air Force Junior ROTC

This book, one in the series on Aerospace Education I, emphasizes the two sides of aerospace--military aerospace and civilian aerospace. Chapter 1 includes a brief discussion on the organization of Air Force bases and missile sites in relation to their missions. Chapter 2 examines the community services provided by Air Force bases. The topics discussed in Chapter 3 are Air Force community relations and various educational opportunities available to personnel. Chapter 4 deals with the functioning aspects of the aerospace industry. The last chapter lists a large number of careers with a brief description for each of them. A section in this chapter explains the required education standards for most of the Air Force jobs. The book is designed for use in the Air Force Junior ROTC program. (PS)

ED 111 614 SE 017 451

Moynihan, Eileen P.

Aerospace Community. Aerospace Education I. Instructional Unit V.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Report No—AE-1-7105

Pub Date Sep 73

Note—52p.; For the accompanying textbook, see SE 017 450

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Aerospace Education, Aerospace Technology, Aviation Technology, *Career Opportunities, Course Organization, Curriculum Guides, *Instructional Materials, *Military Schools, National Defense, *Physical Sciences, Secondary Education, Teaching Guides, Unit Plan

Identifiers—*Air Force Junior ROTC

This curriculum guide is prepared for the textbook entitled "Aerospace Community," published in the Aerospace Education I series. Specific guidelines are suggested for teachers using the textbook. Major categories included in the guidebook for each chapter are objectives (traditional and behavioral), suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Major concepts are briefly discussed with some background material. A blank sheet is included after each chapter for recording teacher ideas. (PS)

ED 111 615 **SE 017 452**

Sayler, D. S. Mackin, T. E.

Space Technology: Propulsion, Control and Guidance of Space Vehicles. Aerospace Education III.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 72

Note—187p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 453

EDRS Price MF-$0.76 HC-$9.51 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Energy, *Fundamental Concepts, *Instructional Materials, *Physical Sciences, Secondary Education, Technology, Textbooks

Identifiers—*Air Force Junior ROTC

This book, one in the series on Aerospace Education III, includes a discussion of the essentials of propulsion, control, and guidance and the conditions of space travel. Chapter 1 provides a brief account of basic laws of celestial mechanics. Chapters 2, 3, and 4 are devoted to the chemical principles of propulsion. Included are the basics of thrust, the differences between solid and liquid propellant engines, devices for generating electrical power in space, the potentialities of nuclear and electric rockets and thrust and thrust-vector controls. Chapter 5 is entitled "Control and Guidance Systems" and deals with topics such as servomechanisms and computers, types of guidance systems, and position fixing or celestial navigation. The final chapter includes a discussion of suborbital, earth orbital, lunar, and interplanetary flight. The book is designed for the Air Force Junior ROTC program. (PS)

ED 111 616 **SE 017 453**

Space Technology: Propulsion, Control and Guidance of Space Vehicles. Aerospace Education III. Instructional Unit II.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date Sep 72

Note—62p.; For the accompanying textbook, see SE 017 452

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Course Organization, Curriculum Guides, Energy, *Fundamental Concepts, *Instructional Materials, *Physical Sciences, Secondary Education, Teaching Guides, Technology, Unit Plan

Identifiers—*Air Force Junior ROTC

This curriculum guide is prepared for the Aerospace Education III series publication entitled "Space Technology: Propulsion, Control and Guidance of Space Vehicles." It provides guidelines for each chapter. The guide includes objectives, behavioral objectives, suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further readings. Page references corresponding to the textbook are given where appropriate. (PS)

ED 111 617 **SE 017 454**

Bulmer, S. B.

International Space Programs. Aerospace Education III.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 73

Note—195p.; Colored drawings may not reproduce clearly; Small print in Appendix A and B. For the accompanying Instructor Handbook, see SE 017 455

EDRS Price MF-$0.76 HC-$9.51 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, *Instructional Materials, *International Programs, Program Descriptions, Research, Secondary Education, Textbooks

Identifiers—Air Force Junior ROTC, International Space Programs, *USSR

This book, one in the series on Aerospace Education III, is a collection of the diverse information available regarding the international space programs. The five goals listed for the book are: to examine the Soviet space program, to understand the future of Soviet space activity, to examine other national and international space programs, to compare the advantages and disadvantages of joint and independent space efforts, and to review some of the international agreements and laws governing space exploration. The book is designed to be used in the Air Force ROTC program. (PS)

ED 111 618 **SE 017 455**

International Space Programs. Aerospace Education III.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date Sep 73

Note—44p.; For the accompanying textbook, see SE 017 454

EDRS Price MF-$0.76 HC-$1.95 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Course Organization, Curriculum Guides, *Instructional Materials, *International Programs, Program Descriptions, Research, Secondary Education, Teaching Guides, Unit Plan

Identifiers—Air Force Junior ROTC, International Space Programs, *USSR

This curriculum guide is prepared for the Aerospace Education III series publication entitled "International Space Programs." The guide is organized according to specific chapters in the textbook. It provides guidelines for teachers in terms of objectives, behavioral objectives, suggested outlines, orientation, suggested key points, instructional aids, projects, and further readings. Page references corresponding to the textbook are given where appropriate. Major concepts in each chapter are listed with brief explanations. (PS)

ED 111 619 **SE 017 456**

Mickey, V. V.

Defense of the United States. Aerospace Education III.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 73

Note—162p.; Colored drawings and photographs may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 457

EDRS Price MF-$0.76 HC-$8.24 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, *Instructional Materials, Military Organizations, *Military Schools, *National Defense, Resource Materials, Secondary Education, Textbooks

Identifiers—*Air Force Junior ROTC, Department of Defense

This publication, one in the series on Aerospace Education III, deals with the background of the defense system of the United States. Description of different wars in which this country was involved includes the development of new military organizations and different weapons. One chapter is devoted in its entirity to the organizational structure of the present Department of Defense. The last chapter reviews the missions and capabilities of the U.S. Army, Navy and Marine forces and describes some of the more advanced equipment employed by each of these forces. The book is designed to be used in the Air Force ROTC program. (PS)

ED 111 620 **SE 017 457**

Cox, Rodney V., Jr.

The Defense of the United States. Aerospace Education III. Instructional Unit V.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date Sep 73

Note—49p.; For the accompanying textbook, see SE 017 456

EDRS Price MF-$0.76 HC-$1.95 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Course Organization, Curriculum Guides, *Instructional Materials, Military Organizations, *Military Schools, *National Defense, Resource Materials, Secondary Education, Teaching Guides, Unit Plan

Identifiers—*Air Force Junior ROTC, Department of Defense

This curriculum guide is prepared for the Aerospace Education III series publication entitled "The Defense of the United States." The guide provides guidelines for each chapter in the textbook as well as general objectives for the complete course. The organization for each chapter includes objectives, behavioral objectives, suggested outline, orientation, suggested key points, instructional aids, projects, and further reading. Page references corresponding to the textbook are given where appropriate. (PS)

ED 111 621 **SE 017 458**

Mackin, T. E.

Propulsion Systems for Aircraft. Aerospace Education II.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 73

Note—136p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 459. This is a revised text for ED 068 292

EDRS Price MF-$0.76 HC-$6.97 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Aviation Technology, Energy, *Engines, *Instructional Materials, *Physical Sciences, Science Education, Secondary Education, Textbooks

Identifiers—*Air Force Junior ROTC

This is a revised text used for the Air Force ROTC program. The main part of the book centers on the discussion of the engines in an airplane. After describing the terms and concepts of power, jets, and rockets, the author describes reciprocating engines. The description of diesel engines helps to explain why these are not used in airplanes. The discussion of the carburetor is followed by an explanation of the lubrication system. The chapter on reaction engines describes the operation of jets, with examples of different types of jet engines. (PS)

ED 111 622 **SE 017 459**

Elmer, James D.

Propulsion Systems for Aircraft. Aerospace Education II. Instructional Unit II.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Report No—AE-2-7202

Pub Date Sep 73

Note—53p.; For the accompanying textbook, see SE 017 458

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Aerospace Education, *Aerospace Technology, Aviation Technology, Course Organization, Curriculum Guides, Energy, *Engines, *Instructional Materials, *Physical Sciences, Science Education, Secondary Education, Teaching Guides, Unit Plan

Identifiers—*Air Force Junior ROTC

This curriculum guide accompanies another publication in the Aerospace Education II series entitled "Propulsion Systems for Aircraft." The guide includes specific guidelines for teachers on each chapter in the textbook. Suggestions are included for objectives (traditional and behavioral), suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Major concepts discussed in the textbook are briefly explained with additional background material. Page references corresponding to the textbook are given. A blank sheet is provided after each chapter for teachers to record ideas. (PS)

ED 111 623 **SE 017 460**

Cox, Rodney V., Jr.

Air Navigation. Aerospace Education II.

Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.

Pub Date 73

Note—135p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 461. This is a revised text for ED 068 289

EDRS Price MF-$0.76 HC-$6.97 Plus Postage

Descriptors—*Aerospace Education, Aerospace Technology, Aviation Technology, *Instructional Materials, Methods, *Navigation, *Resource Materials, Science Education, Secondary Education, Textbooks

Identifiers—*Air Force Junior ROTC

This revised textbook, published for the Air Force ROTC program, contains a discussion of basic and essential understandings about air navigation. The first part of the book describes maps, air navigation charts, flight planning, and pilotage preflight. Basic differences between ground maps and air charts are described and the methods of expressing position, direction, distance, and time are explained. The last three chapters include a description of different types of navigation instruments and aids used in flight. (PS)

ED 111 624 **SE 017 461**
Cox, Rodney V., Jr.
Air Navigation. Aerospace Education II. Instructional Unit III.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Report No—AE-2-7203
Pub Date Sep 73
Note—59p.; For the accompanying textbook, see SE 017 460
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, Aerospace Technology, Aviation Technology, Course Organization, Curriculum Guides, *Instructional Materials, Methods, *Navigation, *Resource Materials, Science Education, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This curriculum guide is an accompanying publication for the textbook entitled "Air Navigation" in the Aerospace Education II series. The guide provides guidelines for teachers using the textbook in terms of objectives, behavioral objectives, suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading for each chapter. A blank sheet is attached after each chapter for recording teacher ideas. . Page references are given corresponding to the textbook. (PS)

ED 111 625 **SE 017 462**
Callaway, R. O. Elmer, James D.
Civil Aviation and Facilities. Aerospace Education II.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date 73
Note—129p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 463. This is a revised text for ED 068 290
EDRS Price MF-$0.76 HC-$6.97 Plus Postage
Descriptors—*Aerospace Education, Aerospace Technology, *Agency Role, Airports, Aviation Technology, *Government Role, *Instructional Materials, *National Organizations, Secondary Education, Textbooks
Identifiers—*Air Force Junior ROTC, Airlines

This is a revised textbook for use in the Air Force ROTC training program. The main theme of the book is concerned with the kinds of civil aviation facilities and many intricacies involved in their use. The first chapter traces the development of civil aviation and the formation of organizations to control aviation systems. The second chapter describes varieties of aviation for which the term "general aviation" is used. This includes brief descriptions of agricultural, business, instructional, recreational, air taxi service, and civil air patrol aviation systems. The third chapter delves into the problems related to the management of aviation facilities. The fourth chapter presents a discussion of the construction and operation of airports. Finally, the last chapter deals with the development and role of air traffic control. (PS)

ED 111 626 **SE 017 463**
Elmer, James D.
Civil Aviation and Facilities. Aerospace Education II. Instructional Unit IV.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Report No—AE-2-7204
Pub Date Jan 74
Note—53p.; For the accompanying textbook, see SE 017 462
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, Aerospace Technology, *Agency Role, Airports, Aviation Technology, Course Organization, Curriculum Guides, *Government Role, *Instructional Materials, *National Organizations, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC, Airlines

This publication accompanies the textbook entitled "Civil Aviation and Facilities," published in the Aerospace Education II series. It provides teacher guidelines with regard to objectives (traditional and behavioral), suggested outlines, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading for each chapter. A blank sheet is attached at the end of each chapter for recording teacher ideas. Page references corresponding to the textbook are given. (PS)

ED 111 627 **SE 017 464**
Smith, J. C.
Military Aerospace. Aerospace Education II.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date 73
Note—169p.; Colored drawings and photographs may not reproduce clearly. For the accompanying Instructor Handbook, see SE 017 465. This is a revised text for ED 068 291
EDRS Price MF-$0.76 HC-$8.24 Plus Postage
Descriptors—*Aerospace Education, Aerospace Technology, Agency Role, Aviation Technology, *Instructional Materials, *Military Air Facilities, Military Science, *National Defense, Resource Materials, Secondary Education, Textbooks
Identifiers—*Air Force Junior ROTC

This book is a revised publication in the series on Aerospace Education II. It describes the employment of aerospace forces, their methods of operation, and some of the weapons and equipment used in combat and combat support activities. The first chapter describes some of the national objectives and policies served by the Air Force in peace and war. The second and third chapters examine the mission and structure of major Air Force operating commands. The fourth chapter describes the various support commands and operating agencies maintained by the Air Force to back up its combat forces. The last chapter reviews the aerospace role of the Army, Navy, and Marine Corps. (PS)

ED 111 628 **SE 017 465**
Hall, Arthur D.
Military Aerospace. Aerospace Education II. Instructional Unit VI.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Report No—AE-2-7205
Pub Date Sep 73
Note—70p.; For the accompanying textbook, see SE 017 464
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, Aerospace Technology, Agency Role, Aviation Technology, Course Organization, Curriculum Guides, *Instructional Materials, *Military Air Facilities, Military Science, *National Defense, Resource Materials, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This curriculum guide is prepared for the Aerospace Education II series publication entitled "Military Aerospace." Sections in the guide include objectives (traditional and behavioral), suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. A separate sheet is attached after each chapter for teachers' own ideas. Page references corresponding to the textbook are given for major concepts and ideas stressed. (PS)

ED 111 629 **SE 017 466**
Aircraft of Today. [Aerospace Education I. Instructor Handbook.]
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date [71]
Note—74p.; For the accompanying textbook, see ED 068 287
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, Aviation Technology, Course Organization, Curriculum Guides, *Instructional Materials, National Defense, *Physical Sciences, *Resource Materials, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This publication is prepared to accompany the textbook entitled "Aircraft of Today," published in the Aerospace Education I series. The curriculum guide provides guidelines for teachers in terms of various concepts stressed in each chapter and suggested methodology for instruction. The subdivisions in the guidebook for each chapter include objectives, behavioral objectives, textbook outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Page references corresponding to the textbook are given where appropriate. (PS)

ED 111 630 **SE 017 467**
The Aerospace Age. Aerospace Education I. Instructional Unit II.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date [71]
Note—73p.; For the accompanying textbook, see ED 068 286
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, Course Organization, Curriculum Guides, Development, History, *Instructional Materials, Resource Materials, *Science History, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This curriculum guide is prepared for the textbook entitled "The Aerospace Age," published in the Aerospace Education I series. The guide is organized by objectives, behavioral objectives, textbook outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Major points stressed in the textbook are briefly explained in the guide. Some background information is also included on each chapter. Page references corresponding to the textbook are given. (PS)

ED 111 631 **SE 018 057**
Coard, E. A.
Human Requirements of Flight. Aviation and Spaceflight. Aerospace Education III.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date 74
Note—197p.; Colored drawings and photographs may not reproduce clearly. For the accompanying Instructor Handbook, see SE 018 058
EDRS Price MF-$0.76 HC-$9.51 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, Biological Influences, Biological Sciences, Biology, Human Body, *Instructional Materials, Physical Sciences, *Physiology, Secondary Education, Textbooks
Identifiers—*Air Force Junior ROTC

This book, one in the series on Aerospace Education III, deals with the general nature of human physiology during space flights. Chapter 1 begins with a brief discussion of the nature of the atmosphere. Other topics examined in this chapter include respiration and circulation, principles and problems of vision, noise and vibration, and self-imposed stresses. Chapter 2 provides an account of aerospace medicine. The next two chapters are devoted to a general description of protective equipment used by fliers, pilot training, and surviving and living in space. Chapters 5 and 6 provide information on skylab and future space flights. The book is designed to be used in the Air Force ROTC program. (PB)

ED 111 632 **SE 018 058**
Hall, Arthur D.
Human Requirements of Flight. Aerospace Education III. Instructional Unit IV.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Report No—AE-3-7304
Pub Date Apr 74
Note—70p.; For the accompanying textbook, see SE 018 057
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, Biological Influences, Biological Sciences, *Biology, Course Organization, Human Body, *Instructional Materials, Physical Sciences, *Physiology, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This curriculum guide is prepared for the Aerospace Education III series publication entitled "Human Requirements of Flight." It provides specific guidelines for teachers using the textbook. The guidelines for each chapter are organized according to objectives (traditional and behavioral), suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. Brief explanations regarding major concepts are included. Page references corresponding to the textbook are given where appropriate. (PS)

ED 111 638 SE 019 338
Elmer, James D.
Theory of Aircraft Flight. Aerospace Education II.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Pub Date 74
Note—142p.; Colored drawings may not reproduce clearly. For the accompanying Instructor Handbook, see SE 019 339. This is a revised text for ED 068 293
EDRS Price MF-$0.76 HC-$6.97 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, *Instructional Materials, *Physical Sciences, *Physics, Secondary Education, Textbooks
Identifiers—*Air Force Junior ROTC

This revised textbook, one in the Aerospace Education II series, provides answers to many questions related to airplanes and properties of air flight. The first chapter provides a description of aerodynamic forces and deals with concepts such as acceleration, velocity, and forces of flight. The second chapter is devoted to the discussion of properties of the atmosphere. How different characteristics of the atmosphere help make flight possible, how man can harness the air for flight, and several other questions related to balancing of forces in the air are discussed in chapter two and three. The discussion in the fourth and fifth chapters centers on how aircraft move through the air. The next two chapters discuss the aircraft structure and various kinds of instruments used to control flight. A brief description of navigation instruments is also included. The book is designed for use in the Air Force ROTC program. (PS)

ED 111 639 SE 019 339
Elmer, James D.
Theory of Aircraft Flight. Aerospace Education II. Instructional Unit I.
Air Univ., Maxwell AFB, Ala. Junior Reserve Office Training Corps.
Report No—AE-2-7201
Pub Date Feb 75
Note—73p.; For the accompanying textbook, see SE 019 338
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Aerospace Education, *Aerospace Technology, Course Organization, Curriculum Guides, *Instructional Materials, *Physical Sciences, *Physics, Secondary Education, Teaching Guides, Unit Plan
Identifiers—*Air Force Junior ROTC

This publication provides guidelines for teachers using the Aerospace Education II series publication entitled "Theory of Aircraft Flight." The organization of the guide for each chapter is according to objectives (traditional and behavioral), suggested outline, orientation, suggested key points, suggestions for teaching, instructional aids, projects, and further reading. A separate sheet is attached at the end of each chapter for teacher ideas for improvement of the chapter. Specific suggestions have been made throughout the guide for the major concepts. Page references corresponding to the textbook are made where appropriate. (PS)

ED 114 148 JC 750 581
Faculty Workload: Community Colleges, Fall 1975.
Hawaii Univ., Honolulu. Community Coll. System.
Report No—CC-IRP-84
Pub Date Nov 75
Note—30p.; Not available in hard copy because a number of pages are printed on colored paper that will not reproduce
EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.
Descriptors—*Class Size, *College Faculty, *Credits, Enrollment Trends, General Education, Instructional Programs, Intellectual Disciplines, *Junior Colleges, Student Enrollment, Tables (Data), *Teaching Load, Vocational Education
Identifiers—*Hawaii

This report organizes fall, 1975 registration data for the seven Hawaii community colleges in tabular form. The focus of the report is on faculty workload in terms of the classroom situation: credits and classes taught, student credit hours generated, and class size. There was a general increase in the number of courses, classes, credit hours, registration and student credit hours at all campuses. The number and proportion of classes with 10 or fewer students have declined at most colleges, while average class sizes are slightly larger. As in the past, average class size in general education courses is larger (30 students) than in vocational education courses (26 students). Average class size varies by campus, from 24-31. Faculty workload figures indicate a generally lighter load at the colleges compared to fall, 1974 and fall, 1973, especially in terms of credit hours taught and faculty-student ratios. The productivity ratios, however, show a slight increase at most of the colleges. A comparison with fall, 1974 data shows increases in the number of instructors at all colleges. Tables break down the data by institution and instructional subject areas. (Author/NHM)

ED 118 732 CE 005 171
Aerospace/Aviation Science Occupations.
North Carolina State Dept. of Public Instruction, Raleigh. Div. of Occupational Education.
Pub Date 72
Note—163p.; Prepared by the Trade and Industrial Education Section
EDRS Price MF-$0.83 HC-$8.69 Plus Postage
Descriptors—*Aerospace Education, *Aviation Technology, Career Education, Course Content, *Course Descriptions, *Curriculum Guides, Secondary Education, *Unit Plan, Vocational Education

The guide was developed to provide secondary students the opportunity to study aviation and aerospace education from the conceptual and career approach coupled with general education specifically related to science. Unit plans were prepared to motivate, develop skills, and offer counseling to the students of aviation science and occupational aerospace education. The course is designed as a three-year study program comprising Aviation Science One (First Semester, 10 units); Aviation Science Two (Second Semester, 10 units); Occupational Aerospace Three (Second Year, 11 units); Occupational Aerospace Four (Third Year, 14 units). Each unit is outlined under the following headings: teaching unit objectives; recommended prerequisites; teaching unit length; evaluation; teacher competency; instructional materials; general comment; student behavioral objective; and for each objective, content, suggested learning experiences, evaluation techniques, and instructional materials. Texts and audiovisual instructional resources are listed for use in the program as well as tools and equipment needed for the study of aerospace/aviation science. (Author/EC)

ED 125 934 SO 009 160
McCallum, W. F. Botly, D. H.
Nautical Charts: Another Dimension in Developing Map Skills. Instructional Activities Series IA/S-11.
National Council for Geographic Education.
Pub Date [75]
Note—20p.; For related documents, see ED 096 235 and SO 009 140-167
Available from—NCGE Central Office, 115 North Marion Street, Oak Park, Illinois 60301 ($1.00, secondary set $15.25)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Classroom Techniques, Earth Science, *Geography Instruction, Illustrations, Knowledge Level, Learning Activities, Maps, *Map Skills, *Navigation, Oceanology, Physical Environment, Physical Geography, Secondary Education, *Simulation, Skill Development, Social Studies, Teaching Methods, Visual Aids

These activities are part of a series of 17 teacher-developed instructional activities for geography at the secondary grade level described in SO 009 140. In the activities students develop map skills by learning about and using nautical charts. The first activity involves students in using parallel rulers and a compass rose to find their bearings. Their ship, Prince Edward, lies in an anchorage. They must take a bearing of eight other ships and record these bearings in the deck log. In the second activity students use dividers and the latitude scale to measure distance. During the class project they lay out courses to steer and distances to run to bring their ship from one designated position to another. In the third activity students learn to interpret the common symbols found on a nautical chart by responding to discussion questions. Activity four is a simulation exercise in which students apply the skills learned and the knowledge gained in the first three exercises by using a nautical chart to move their ship from Passage Island to Thunder Bay. Brief explanations, diagrams, maps, symbol definitions, and a glossary of terms are provided. (Author/DH)

ED 133 161 SE 021 476
Muccilli, Kathie
Archaeology/Ecology. [Project ECOLogy ELE Pak, Muccilli Pak].
Highline Public Schools, Seattle, Wash.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date [76]
Note—66p.; For related documents, see SE 021 438-478
Available from—Highline Public Schools, Instructional Division, Project ECOLogy ESEA Title III, Bill Guise, Director, 15675 Ambaum Blvd., S.W., Seattle, WA 98166 ($2.50)
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Anthropology, Archaeology, *Ecology, Environment, Environmental Education, *Instructional Materials, *Junior High School Students, *Sciences, *Social Studies, Units of Study (Subject Fields)
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit was written for seventh-grade students in anthropology. The six lessons and suggested activities will take from 15 to 30 days to complete. Each lesson includes the concept of the lesson, materials needed, notes to the teacher, procedure, evaluative activities, and suggested additional activities. The materials were tried and evaluated; evaluation data may be obtained from the Highline Public Schools. (RH)

ED 133 199 SE 021 775
Jacobs, Kenneth Charles
Extragalactic Astronomy: The Universe Beyond Our Galaxy.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-129
Pub Date Sep 76
Note—44p.; For related documents, see SE 021 773-776
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00657-8, $1.30)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Astronomy, Curriculum, *Instructional Materials, Science Education, *Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The material is presented in three parts: one section provides the fundamental content of extragalactic astronomy, another section discusses modern discoveries in detail, and the last section summarizes the earlier discussions within the structure of the Big Bang Theory of Evolution. Each of the three sections is followed by student exercises and activities, laboratory projects, and questions and answers. The glossary contains unfamiliar terms used in the text and a collection of teacher aids such as literature references and audiovisual materials. (MH)

ED 133 200 SE 021 776
Straka, W. C.
The Supernova - A Stellar Spectacle.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-126

Pub Date Sep 76
Note—50p.; For related documents, see SE 021 773-775; Photographs may not reproduce well
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00654-3, $1.30)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Astronomy, Curriculum, *Instructional Materials, Science Education, *Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration, *Supernovae

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics concerning supernovae are included: the outburst as observed and according to theory, the stellar remnant, the nebular remnant, and a summary of some of the unsolved puzzles. Suggested student projects are given, with several levels of difficulty, so that the teacher may choose material appropriate for the particular class. (MH)

ED 141 148 SE 022 670
The Moon, the Sun, and Tides. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 214. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—27p.; For related documents, see SE 022 662-687; Contains marginal legibility in Tables
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Earth Science, *Instructional Materials, *Oceanology, *Secondary Grades, *Secondary School Science, *Teaching Guides, Units of Study
Identifiers—Project COAST, *Tides

This unit for students in grades 6-12 is designed to provide an introduction to the variables that cause tides. Included are teacher background materials, a possible three-day schedule, master sheets for transparencies, student activity materials, tests, and references to selected films and books. (RH)

ED 141 149 SE 022 671
What Is Physical Oceanography? A Learning Experience for Coastal and Oceanic Awareness Studies, No. 217. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—14p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—*Instructional Materials, *Oceanology, Physical Sciences, Secondary Grades, *Secondary School Science, *Teaching Guides, Units of Study
Identifiers—Project COAST

This unit is concerned with an overview of physical oceanography - the study of currents, tides, waves, and particle movements. The activities are designed for use by junior high school age students. Included in the unit are activities related to properties of sea water, physical phenomena of the ocean, and physical features of the ocean. Activities include background materials, suggested activities, and evaluation materials. (RH)

ED 141 150 SE 022 672
Microfossils from the Local Marine Environment. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 219. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—34p.; For related documents, see SE 022 662-687; Contains occasional light and broken type
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Biology, Earth Science, *Instructional Materials, Marine Biology, *Oceanology, *Science Activities, *Secondary Education, *Secondary School Science, Units of Study
Identifiers—Fossils, Project COAST

This unit on fossils is designed for junior high school students. Students collect a sediment sample, process the sample, and examine it for microfossils. The scientific classification and naming of microfossils is not stressed. Included in the materials are evaluation items, background materials for teachers, lists of needed materials, vocabulary list, and student materials. (RH)

ED 141 151 SE 022 673
Air and Life. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 223. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—26p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Biology, Environment, *Instructional Materials, *Oceanology, *Science Activities, Secondary Education, *Secondary School Science, *Units of Study
Identifiers—*Air, Project COAST

The purpose of these activities is to offer the secondary school student an opportunity to review what he/she has learned about air by moving quickly through a series of "Do-it-yourself" experiments. Emphasis is placed on the study of the composition of air and relating this information to life in aquatic and marine environments. Included are classroom activities, a list of selected references, and transparency masters. (RH)

ED 141 155 SE 022 677
Marshes: Nature's Bounty. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 230. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—23p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Biology, Earth Science, *Ecology, *Instructional Materials, *Marine Biology, *Oceanology, Secondary Education, *Secondary School Science, *Units of Study
Identifiers—*Marshes, Project COAST

This unit is designed for secondary school students. It is concerned with the concept of the marsh and includes activities related to the importance of the marshes; the aesthetic, recreational, and economic roles of marshes; the marsh food web; man's impact on marshes; and how to preserve marshes. Materials in the unit include evaluation materials, narration materials for 35 mm slides related to a marsh, transparency masters, and selected references. (RH)

ED 141 156 SE 022 678
Sea Floor Spreading. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 302. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—72p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Earth Science, *Geology, *Instructional Materials, *Oceanology, Secondary Grades, *Secondary School Science, *Teaching Guides, Units of Study
Identifiers—Project COAST

This unit is concerned with geology of the sea floor. It is designed for secondary school students. Included in this unit are teacher background materials, student activities, transparency masters, maps, and answers to student activities. Changes taking place in the sea floor and variables influencing these changes are emphasized. (RH)

ED 141 161 SE 022 683
Salinity Changes in a Tidal River. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 308. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—45p.; For related documents, see SE 022 662-687
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Earth Science, Environment, *Instructional Materials, *Oceanology, Secondary Grades, *Secondary School Science, *Teaching Guides, *Units of Study
Identifiers—Project COAST, Rivers, *Salinity

The materials in this packet are designed to aid teachers in the implementation of a science field studies unit concerning tidal rivers. The packet consists of the following: (1) background material for the teacher; (2) lab exercises; (3) field activities; and (4) classroom activities. The overall purpose of this packet is to provide information for organizing and conducting a marine field study, and interpreting and using data gathered from the study. Concepts such as tidal flow theory, the relation of specific gravity to salinity, proper field procedure, and data correlations are included. The activity is designed for secondary school students. Included are objectives, student activity materials, data sheets, discussion topics, a posttest, and a selected bibliography. (RH)

ED 141 164 SE 022 686
Construction of a Model Solar Building. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 318. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—20p.; For related documents, see SE 022 662-687; Contains occasional light and broken type
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Building Design, *Energy, *Energy Conservation, *Instructional Materials, *Models, Oceanology, Physical Sciences, Secondary Education, *Secondary School Science, *Student Projects, Teaching Guides, Units of Study
Identifiers—Project COAST, *Solar Energy

This activity is designed for secondary school students. The process of constructing a model solar building includes consideration of many fundamental scientific principles, such as the nature of heat, light, electricity, and energy conversion technology. When the model solar building is completed, there are numerous possibilities for the use of the model for studies of the principles of energy conversion. Included are a description of needed materials and equipment, construction tips, diagrams to assist in the construction procedures, suggested uses of the model, and selected references. (RH)

ED 141 175 SE 022 700
Marine and Environmental Studies Field Manual.
Cranston School Dept., R.I.; Warwick School Dept., R.I.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Sep 73
Note—148p.; Page 77 missing from document; Best Copy Available
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—Animal Science, *Biological Sciences, Earth Science, Geology, *Instructional Materials, *Oceanology, Physical Sciences, Plant Science, Secondary Education, *Secondary School Science, *Units of Study
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Tides

This laboratory manual was developed for a field-oriented high school oceanology program. The organization of the units includes a selection of supplementary activities to allow students to explore ocean studies in more depth. Included are 19 units. The units include biological oceanography, physical oceanography, and some social science topics. A suggested sequence of activities is provided. (RH)

ED 166 055 SE 026 585
Sidey, D. And Others
Fracture Education in Engineering.
Pub Date—78
Note—22p.; Contains occasional light and broken type ; Paper Presented at the Canadian Conference on Engineering Education (Montreal, Canada, May 15-16, 1978)
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—*Conference Reports, *Course Content, *Curriculum Design, *Engineering, *Engi-

neering Education, Science Education, Teaching Techniques

Identifiers—*Fracture Mechanics

Fracture mechanics is a multidisciplinary topic which is being introduced to undergraduate engineering students in such courses as materials engineering. At a recent Conference on Fracture held at the University of Waterloo, a session was devoted to fracture education. Some of the ideas presented at that session are included and discussed here. The method of teaching fracture at Waterloo is then described. This method uses a cooperative system with alternate work and study terms over a five-year period. The paper concludes by focusing on methods of teaching and their relevance to mastery of the desired information and skills. (BB)

ED 170 141 SE 027 603

Brosius, Craig A. And Others

Remote Sensing and the Earth.

Brevard County Board of Public Instruction, Titusville, Fla.; National Aeronautics and Space Administration, Washington, D.C.

Pub Date—Dec 77

Note—515p.; Not available in hard copy due to numerous colored and shaded photographs which may not reproduce well

Available from—School Board of Brevard County, Instructional Services Div., Project Remote Sensing, 1274 South Florida Avenue, Rockledge, Florida 32955 ($9.74)

Pub Type—Guides - Classroom - Learner (051)

EDRS Price - MF02 Plus Postage. PC Not Available from EDRS.

Descriptors—Cartography, *Earth Science, *Environmental Education, Instructional Materials, Learning Activities, Natural Resources, Reference Materials, *Resource Guides, *Science Education, *Secondary Education, *Space Sciences, Technology

Identifiers—*Remote Sensing

This document is designed to help senior high school students study remote sensing technology and techniques in relation to the environmental sciences. It discusses the acquisition, analysis, and use of ecological remote data. Material is divided into three sections and an appendix. Section One is an overview of the basics of remote sensing. Section Two contains selected readings which report formal research in agriculture, land use, geology, water resources, marine resources, and the environment. Section Three is composed of fundamental laboratory exercises which explore map reading and analysis, characteristics of the visible spectrum, and other relevant areas. The appendix contains supplemental references. Document includes numerous photographs and drawings, as well as study guides after each chapter. (MA)

ED 177 012 SE 029 132

The Ocean: Source of Nutrition for the Future. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.; Maine Univ., Orono. Sea Grant Program.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—78

Note—45p.; For related documents, see SE 029 133-135; Not available in hard copy due to copyright restrictions

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Biology, Class Activities, Earth Science, Ecology, *Environmental Education, *Home Economics Education, *Interdisciplinary Approach, Marine Biology, Oceanology, *Science Education, Secondary Education, Social Studies

Identifiers—*Sea Grant

This unit provides lessons utilizing aspects of aquaculture to portray concepts in several secondary school disciplines. Extensive background is provided on four marine species currently cultured in Maine. The history of aquaculture in Maine is provided. A bibliography of sources of information on aquaculture follows the background section. Two lesson outlines are provided. Each includes an introduction, overview, teacher and student background, and suggested activities according to the discipline being considered. Appendices include a list of marine aquaculture companies, directions for the establishment of a marine aquarium, and a list of information resources. (RE)

ED 177 013 SE 029 133

Have You Ever Been to the Shore Before? A Marine Education Infusion Unit. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.; Maine Univ., Orono. Sea Grant Program.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—78

Note—54p.; For related documents, see SE 029 132-135; Not available in hard copy due to copyright restrictions

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Art Education, *Class Activities, *Earth Science, Ecology, Elementary Education, *Environmental Education, *Interdisciplinary Approach, Language Arts, Marine Biology, Mathematics Education, Music Education, *Oceanology, Science Education, Social Studies

Identifiers—*Sea Grant

This unit presents the teacher with guidelines and suggestions for a field trip to a shore. It contains information about what organisms and habitat to expect and appropriate activities. Also suggested are discussions of the people who live and work near the shore. A pre-trip planning section is presented. Sections relating to each of several disciplines are presented, including objectives, materials, and procedures relating to the field trip and designed to portray concepts of the discipline. Appendices of resources and sites in northern New England are provided along with a bibliography. (RE)

ED 177 014 SE 029 134

Navigation. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.; Maine Univ., Orono. Sea Grant Program.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—78

Note—51p.; For related documents, see SE 029 132-135; Not available in hard copy due to copyright restrictions

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Astronomy, Earth Science, Ecology, Environment, *Environmental Education, Geography, Geometry, Interdisciplinary Approach, *Mathematics Education, *Navigation, Ocean Engineering, Oceanology, *Science Education, *Secondary Education, Technical Education, Technology

Identifiers—*Sea Grant

This guide provides student practice problems which use the procedures of ship navigators to reinforce the skills of mathematics learned in the secondary school and which seek to provide examples of the application of mathematical concepts. Along with the practice problems, teacher background material is provided briefly in the body of the unit. More detailed explanations are provided in the appendices. A reference section is included. (RE)

ED 177 015 SE 029 135

The Edible Blue Mussel: A Learning Experience for Marine Education. Northern New England Marine Education Project.

Maine Univ., Orono. Coll. of Education.; Maine Univ., Orono. Sea Grant Program.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Pub Date—78

Note—21p.; For related documents, see SE 029 132-134; Not available in hard copy due to copyright restrictions

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Class Activities, Earth Science, *Ecology, Elementary Secondary Education, *Environmental Education, *Interdisciplinary Approach, Language Arts, Marine Biology, Mathematics Education, *Oceanology, *Science Education, Social Studies

Identifiers—*Sea Grant

The major unifying concept for each of the disciplinary sections in this curriculum infusion unit is that the blue mussel is an easily obtainable, high quality, very palatable seafood. A section is provided for teacher familiarity with the anatomy and ecological background of the mussel. The guide is arranged by discipline areas. Sections provide objectives and directions for activities involving use of mussels to portray concepts of the discipline. (RE)

ED 178 296 SE 028 642

Lien, Violetta F.

Investigating the Marine Environment and Its Resources, Part I.

Texas A and M Univ., College Station.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Report No.—TAMU-SG-79-401

Pub Date—Jun 79

Grant—NOAA-04-8-M-01-169

Note—349p.; For Part II, see SE 028 643

Available from—Sea Grant Program, Texas A&M University, College Station, Texas 77843 (Parts I and II $8.00)

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC14 Plus Postage.

Descriptors—Class Activities, *Ecology, *Environment, *Environmental Education, *Environmental Influences, Marine Biology, Natural Resources, Oceanology, *Science Education, *Water Resources

Identifiers—*Sea Grant

This is the first of two volumes comprising a resource unit designed to help students become more knowledgeable about the marine environment and its resources. Included in this volume are discussions of geography of the Gulf of Mexico, geology, physical characteristics of the marine environment, marine ecology, and ocean land interaction. Discussions are intended to help students analyze their life-style and how it is influenced by the marine environment and their use of marine resources. (Author/RE)

ED 178 297 SE 028 643

Lien, Violetta F.

Investigating the Marine Environment and Its Resources, Part II.

Texas A and M Univ., College Station.

Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Report No.—TAMU-SG-79-401

Pub Date—Jun 79

Grant—NOAA-04-8-M-01-169

Note—282p.; For Part I, see SE 028 642

Available from—Sea Grant Program, Texas A & M University, College Station, Texas 77843 (Parts I and II $8.00)

Pub Type—Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC12 Plus Postage.

Descriptors—Class Activities, *Ecology, *Environment, *Environmental Education, *Environmental Influences, Marine Biology, Natural Resources, Oceanology, *Science Education, *Water Resources

Identifiers—*Sea Grant

This is the second of two volumes comprising a resource unit designed to help students become more knowledgeable about the marine environment and its resources. Included in this volume are discussions of changes in the human and marine environment, human needs, marine resources, living marine resources, marine transportation, marine energy sources, recreation, and esthetics of the marine environment. Discussions are intended to help students analyze their life-style and how it is influenced by the marine environment and their use of marine resources. (Author/RE)

ED 178 306 SE 029 031

Nimmer, Donald N. Sogness, Richard L.

How To...Activities in Meteorology.

National Science Teachers Association, Washington, D.C.

Pub Date—78

Note—13p.; Not available in hard copy due to copyright restrictions

Available from—National Science Teachers Association, 1742 Connecticut Ave., N.W., Washington, D.C. 20009 (Stock No. 471-14756; no price quoted)
Pub Type— Guides - Classroom - Learner (051) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Climatic Factors, *Earth Science, Laboratory Procedures, *Meteorology, *Science Course Improvement Project, *Science Education, Science Materials, *Sciences, Secondary Education
Identifiers—National Science Teachers Association

This series of experiments seeks to provide laboratory exercises which demonstrate concepts in Earth Science, particularly meteorology. Materials used in the experiments are easily obtainable. Examples of experiments include: (1) making a thermometer; (2) air/space relationship; (3) weight of air; (4) barometers; (5) particulates; (6) evaporation; (7) relative humidity; (8) temperatures of different earth surfaces; (9) wind; and (10) winter activities. (RE)

ED 178 307 SE 029 032
Nimmer, Donald N. Sagness, Richard L.
How To...Activities in Physical Oceanography.
National Science Teachers Association, Washington, D.C.
Pub Date—78
Note—9p.; Not available in hard copy due to copyright restrictions
Available from—National Science Teachers Association, 1742 Connecticut Ave., N.W., Washington, D.C. 20009 (Stock No. 471-14754; no price quoted)
Pub Type— Guides - Classroom - Learner (051) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Earth Science, *Laboratory Procedures, *Oceanology, *Science Education, Science Materials, *Sciences, Secondary Education, Water Resources
Identifiers—National Science Teachers Association

This series of experiments seeks to provide laboratory exercises which demonstrate concepts in Earth Science, particularly oceanology. Materials used in the experiments are easily obtainable. Examples of experiments include: (1) comparison of water hardness; (2) preparation of fresh water from sea water; (3) determination of water pressure; (4) measuring water clarity; (5) collection and analysis of water samples; (6) study of waves; (7) beach formation and erosion; (8) density currents; and (9) study of icebergs. (RE)

ED 178 332 SE 029 262
Schlenker, Richard M. Perry, Constance M.
A Writing Guide for Student Oceanography Laboratory and Field Research Reports.
Pub Date—Oct 79
Note—21p.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Composition Skills (Literary), Earth Science, *Environment, Expository Writing, Language Arts, *Oceanology, *Scientific Literacy, *Technical Writing, *Writing, Writing Skills

This guide is intended to improve the writing and composition skills of oceanography students but it may be applied to other written scientific compositions. Discussed is the documenting of laboratory and field investigations during the activity. A suggested format for the research report is presented with discussions of each section. A segment is devoted to tips for writing a good report. Sample short reports are included in the guide. (RE)

ED 178 338 SE 029 274
Boyer, Robert E.
Field Guide to Rock Weathering. Earth Science Curriculum Project Pamphlet Series PS-1.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-1
Pub Date—71
Note—43p.; For related documents, see SE 029 275-283; Not available in hard copy due to copyright restrictions; Photographs and colored drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Chemistry, *Earth Science, Environment, *Environmental Influences, Field Trips, Instructional Materials, *Meteorology, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, Soil Conservation, Urban Environment
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Highlighted are the effects of weathering through field investigations of the environment, both natural rocks, and the urban environment's pavements, buildings, and cemeteries. Both physical weathering and chemical weathering are discussed. Questions are presented for post-field trip discussion. References and a glossary are provided. (Author/RE)

ED 178 339 SE 029 275
Foth, Henry Jacobs, Hyde S.
Field Guide to Soils. Earth Science Curriculum Project Pamphlet Series PS-2.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-2
Pub Date—71
Note—44p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Chemistry, *Earth Science, Ecology, *Field Studies, Geology, Instructional Materials, Natural Resources, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, *Soil Conservation, Soil Science
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Discussed are the importance of soil to plant and animal life, the evolution of a soil profile, and the major kinds of soil in the United States. On a suggested field trip, students examine different kinds of soil profiles; they also measure soil acidity and water-holding capacity. Suggestions for further study are provided along with references and a glossary. (Author/RE)

ED 178 340 SE 029 276
Freeman, Tom
Field Guide to Layered Rocks. Earth Science Curriculum Project Pamphlet Series PS-3.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-3
Pub Date—71
Note—50p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Earth Science, Environment, *Field Studies, Field Trips, *Geology, Instructional Materials, Paleontology, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Presented is the study of sequences of rock layers as the basis for historical geology. Also considered is the influence of rock layers on the appearance of the landscape. Specific relevant laws of geology are presented. Preparation for a field trip is discussed. An example field trip is discussed and field techniques and projects are reviewed. References and a glossary are provided. (Author/RE)

ED 178 341 SE 029 277
Beerbower, James R.
Field Guide to Fossils. Earth Science Curriculum Project Pamphlet Series PS-4.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-4
Pub Date—71
Note—59p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Earth Science, Ecology, Environmental Education, *Field Studies, Field Trips, Geology, Instructional Materials, *Paleontology, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, *Secondary School Science
Identifiers—*Earth Science Curriculum Project, National Science Foundation

This guide introduces the study of fossils and means through which this study may provide clues to ancient environments and geology. Presented are discussions about the origin of many types of organisms, origin of organic communities, evolution, and extinction of species. Suggestions are provided for likely collection sites, methods of collection, identification of fossils, and field techniques. Appendices, references, and a glossary are provided. (Author/RE)

ED 178 342 SE 029 278
Romey, William D.
Field Guide to Plutonic and Metamorphic Rocks. Earth Science Curriculum Project Pamphlet Series PS-5.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-5
Pub Date—71
Note—58p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Earth Science, Field Studies, Field Trips, *Geology, *Geophysics, Instructional Materials, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, *Secondary School Science
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Suggested are methods for the collection of field evidence about processes that form plutonic and metamorphic rock. Description and discussion of these types of rocks are provided. The planning and execution of a successful field trip is discussed. Advanced field projects are also discussed. Included are five appendices, references, and a glossary. (RE)

ED 178 343 SE 029 279
Rapp, George, Jr.
Color of Minerals. Earth Science Curriculum Project Pamphlet Series PS-6.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-6
Pub Date—71
Note—40p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Colored photographs, charts and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Chemical Bonding, Chemistry, *Color, *Earth Science, *Geology, Instructional Materials, Physics, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science
Identifiers—*Earth Science Curriculum Project, National Science Foundation

The causes for many of the colors exhibited by minerals are presented to students. Several theories of modern physics are introduced. The nature of light, the manner in which light interacts with matter, atomic theory, and crystal structure are all discussed in relation to the origin of color in minerals. Included are color pictures of many minerals. (Author/RE)

ED 178 344 SE 029 280
Hoyt, John H.
Field Guide to Beaches. Early Science Curriculum Project Pamphlet Series PS-7.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-7
Pub Date—71
Note—50p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Earth Science, Environment, Instructional Materials, Laboratory Procedures, Natural Resources, *Oceanology, Physics, Pollution, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, Water Pollution Control, *Water Resources
Identifiers—*Earth Science Curriculum Project, National Science Foundation

The study of beaches and their capacity as an interface between land, air, and water is presented. Students investigate shore phenomena to better understand the beach's history and possible future. Also discussed is the interaction between man and the beach, from weather effects to pollution. Laboratory investigations of samples collected from the beach and of observations made at the beach are suggested. (Author/RE)

ED 178 345 SE 029 281
Verduin, Jacob
Field Guide to Lakes. Earth Science Curriculum Project Pamphlet Series PS-8.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-8
Pub Date—71
Note—51p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Biology, Chemistry, *Earth Science, Environment, Field Trips, Geology, Instructional Materials, Natural Resources, Physics, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, Water Pollution Control, *Water Resources
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Attention is directed to processes going on in lakes which are not apparent to the observer of their scenic beauty. Explored are the lifetime of lakes, how lakes are formed, elements of a field trip to a lake, and influence of human activities on lakes. Sample post-field trip questions, references, and a glossary of terms are also included. (RE)

ED 178 346 SE 029 282
Dexter, William A.
Field Guide to Astronomy Without a Telescope. Earth Science Curriculum Project Pamphlet Series PS-9.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-9
Pub Date—71
Note—60p.; For related documents, see SE 029 274-283; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Aerospace Education, Aerospace Technology, *Astronomy, *Earth Science, Instructional Materials, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, *Space Sciences
Identifiers—*Earth Science Curriculum Project, National Science Foundation

This guide provides the interested student with a wide range of astronomical investigations that require a minimum of equipment. Activities focus on analysis and understanding of numerous celestial events which are observable every day. The guide is intended to lead the amateur through initial steps in the understanding of some of the functions of the universe. (Author/RE)

ED 178 347 SE 029 283
Moore, Carleton B.
Meteorites. Earth Science Curriculum Project Pamphlet Series PS-10.
American Geological Inst., Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—ESCP-PS-10
Pub Date—71
Note—50p.; For related documents, see SE 029 274-282; Not available in hard copy due to copyright restrictions; Photographs and colored charts, graphs, and drawings may not reproduce well
Pub Type— Guides - General (050) — Collected Works - Serials (022)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Aerospace Education, Aerospace Technology, *Astronomy, *Earth Science, Instructional Materials, *Science Activities, *Science Course Improvement Project, Science Education, Science Instruction, Secondary Education, Secondary School Science, *Space Sciences
Identifiers—*Earth Science Curriculum Project, National Science Foundation

Discussed are meteors from an historical and astronomical viewpoint; then presented is the chemical makeup of iron meteorites, stony meteorites, and stony-iron meteorites. Age determination, moon craters, and tektites are also treated. The interested observer learns how to identify meteorites and to describe how they fall. (Author/RE)

ED 179 352 SE 028 768
Meinke, James D. Kennedy, Beth A.
The Effect of Lake Erie on Ohio's Temperature, Student Guide and Teacher Guide. OEAGLS Investigation 1.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—Feb 79
Grant—NOAA-04-8-M-01-170;
Note—22p.; For related documents, see SE 028 769-774 ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—*Earth Science, Elementary School Science, Environmental Education, *Instructional Materials, Lesson Plans, *Oceanology, *Science Activities, *Science Course Improvement Project, Science Curriculum, Science Education, Science Instruction, Secondary School Science, Worksheets
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This guidebook for teachers is accompanied by a student workbook. The investigations are intended to offer students an opportunity to learn about the absorption and release of heat energy and its effects on the Earth's atmosphere. The influence of Lake Erie on Ohio's temperature is related to the other investigations. Illustrations, maps, and graphs accompany the written material. (SA)

ED 179 353 SE 028 769
Meinke, James D. Kennedy, Beth A.
The Effect of Lake Erie on Climate, Student Guide and Teacher Guide. OEAGLS Investigation 2.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—Apr 79
Grant—NOAA-04-8-M-01-170;
Note—22p.; For related documents, see SE 028 768-774 ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Earth Science, Elementary School Science, Elementary Secondary Education, Environmental Education, *Instructional Materials, Lesson Plans, *Oceanology, *Science Activities, *Science Course Improvement Project, Science Curriculum, *Science Education, Science Instruction, Secondary School Science, Worksheets
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This guidebook for teachers is accompanied by a student workbook. The investigations are intended to offer students an opportunity to study the effects of air temperature on air density and movement, the circulation of air and how it changes the amount of precipitation in the area around the Great Lakes, and the implications of the "lake effect" for the economy of northern Ohio. Illustrations, maps, data tables, and graphs accompany the written material. (Author/SA)

ED 179 354 SE 028 770
Comienski, James Mayer, Victor J.
Ancient Shores of Lake Erie, Student Guide and Teacher Guide. OEAGLS Investigation 3.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—Apr 79
Grant—NOAA-04-8-M-01-170;
Note—29p.; For related documents, see SE 028 768-774; Maps in Teacher Guide will not reproduce well due to small and light type ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Earth Science, Elementary School Science, Elementary Secondary Education, Environmental Education, *Instructional Materials, Lesson Plans, *Oceanology, *Science Activities, *Science Course Improvement Project, Science Curriculum, Science Education, Science Instruction, Secondary School Science, *Worksheets
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This guidebook for teachers is accompanied by a student workbook. The investigations are intended to offer the students an opportunity to learn to use topographic maps and profiles to locate evidence of ancient water levels of Lake Erie and man's use of the beach ridges near the lake. Maps, diagrams, and data tables accompany the written material. (Author/SA)

ED 179 355 SE 028 771
Farnsworth, Carolyn Mayer, Victor J.
Lake Erie and Changing Lake Levels, Student Guide and Teacher Guide. OEAGLS Investigation 5.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—Mar 79
Grant—NOAA-04-8-M-01-170;
Note—26p.; For related documents, see SE 028 768-774 ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Earth Science, Elementary School Science, Elementary Secondary Education, Environmental Education, *Instructional Materials, Lesson Plans, *Oceanology, *Science Activities, *Science Course Improvement Project, Science Curriculum, *Science Education, Science Instruction, Secondary School Science, Worksheets
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This guidebook for teachers is accompanied by a student workbook. The investigations are intended to offer students an opportunity to learn about the causes and effects of increases in the level of Lake

Erie and the effects of lake level regulation. Illustrations and graphs accompany the written material. (Author/SA)

ED 179 356 **SE 028 772**
Kennedy, Beth A. Fortner, Rosanne W.
Coastal Processes and Erosion. Student Guide and Teacher Guide. OEAGLS Investigation 7.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—Feb 79
Grant—NOAA-04-8-M-01-170;
Note—39p.; For related documents, see SE 028 768-774 ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Curriculum Development, Environmental Education, *Geology, Instructional Materials, *Oceanology, *Science Activities, Science Course Improvement Project, Science Curriculum, Science Education, Science Instruction, Secondary Education, Secondary School Science
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This investigation focuses on the major erosional forces affecting the shoreline which cause it to wear away and build up. The types of devices that protect the shoreline are also discussed. The investigation is presented in the form of a teachers' guide and a students' guide, both of which are included. In the teachers' guide, an overview of the material is followed by the objectives and procedures to use during the investigation. Materials and objectives are listed and suggestions are given on the approach to use. Transparency masters accompany the teachers' guide and instructions are included. Review questions are suggested. (SA)

ED 179 357 **SE 028 773**
Fortner, Rosanne Reil, Gabriele
Yellow Perch in Lake Erie. Student Guide and Teacher Guide. OEAGLS Investigation 9.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—May 79
Grant—NOAA-04-8-M-01-170;
Note—48p.; For related documents, see SE 028 768-774; Page 9 in the Teacher Guide removed due to copyright restrictions ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Curriculum Development, *Educational Games, Environmental Education, Geology, Instructional Materials, Natural Resources, *Oceanology, *Science Activities, Science Course Improvement Project, Science Curriculum, Science Education, Science Instruction, Secondary Education, Secondary School Science, *Wildlife Management, Zoology
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This investigation focuses on the life cycle of the yellow perch, the factors which can affect perch populations at each stage of the life cycle, and the methods used to manage Lake Erie perch populations. The investigation is presented in the form of a teachers' guide and a students' guide. It consists of two games related to the management of perch. The first game introduces the perch life cycle and forces which act on the population. The second game presents roles for the student to assume in a group planning situation for development of perch management policy for Lake Erie. An overview is given, followed by the prerequisite student background for success in the lesson. Necessary materials are listed. (Author/SA)

ED 179 358 **SE 028 774**
Leach, Susan Mayer, Victor J.
Evidence of Ancient Seas in Ohio. Student Guide and Teacher Guide. OEAGLS Investigation 10.
Ohio State Univ., Columbus. Research Foundation.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
Pub Date—May 79
Grant—NOAA-04-8-M-01-170;
Note—23p.; For related documents, see SE 028 768-773; Figures may not reproduce well ; Prepared in collaboration with the Ohio Sea Grant Program
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Curriculum Development, *Energy, Environmental Education, *Geology, Instructional Materials, *Natural Resources, *Oceanology, Science Activities, Science Course Improvement Project, Science Curriculum, Science Education, Science Instruction, Secondary Education, Secondary School Science
Identifiers—*Oceanic Education Activ for Great Lakes Schools, Ohio Sea Grant

This investigation presents activities related to the geological history of Ohio and Ohio's mineral wealth. Energy is discussed briefly as it relates to high sulfer content Ohio coal. The lessons are presented in the form of a teachers' guide and a students' guide. In the teachers' guide, an overview of the study is followed by the prerequisite student background needed for successful completion of the work. Materials and objectives are listed and suggestions for acquisition of specimens are described. (SA)

ED 180 801 **SE 029 523**
Munsell, Nan
Project Archeology: Saving Traditions (P.A.S.T.).
Pacific Science Center, Seattle, Wash.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date—79
Note—11p.; Not available in hard copy due to copyright restrictions
Pub Type— Reports - Descriptive (141) — Guides - Non-Classroom (055)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Archaeology, *Curriculum, Elementary Secondary Education, History, *Interdisciplinary Approach, Natural Resources, *Program Evaluation, *Science Education, *Social Studies

Presented is a curriculum in archaeology for grades 6, 7, and 8. The curriculum covers 10,000 years of history common to America and presents material for interdisciplinary presentation. The effectiveness of the curriculum, based on evaluation data, is predicted. Data were collected via a pre- and post-test. Validity, sensitivity, and reliability measures are presented for the evaluative instrument. Conclusions drawn from the study are included. (RE)

ED 180 810 **SE 029 539**
Metro, Peter M. Green, Rachel E.
Weather & Weather Maps. Teacher's Manual.
Rocky River Public Schools, Ohio.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.
Pub Date—Mar 77
Note—28p.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Earth Science, Environment, *Environmental Education, Mathematics, *Meteorology, Natural Resources, Science Activities, *Science Education, Secondary Education, Teaching Guides

This guide is intended to provide an opportunity for students to work with weather symbols used for reporting weather. Also included are exercises in location of United States cities by latitude and longitude, measurement of distances in miles and kilometers, and prediction of weather associated with various types of weather fronts. (RE)

ED 187 517 **SE 030 367**
Marine Science Syllabus for Secondary Schools. Report of an IOC Workshop on the Preparation of a Marine Science Syllabus for Secondary Schools. Unesco Reports in Marine Science, 5.
United Nations Educational, Scientific, and Cultural Organization, Paris (France). Div. of Marine Sciences.
Pub Date—79
Note—45p.; Workshop held at the United World College of the Atlantic, United Kingdom, June 5-9, 1978.
Available from—Unipub, 345 Park Avenue South, New York, NY 10010 (no price quoted).
Pub Type— Collected Works - Proceedings (021) — Guides - Classroom - Teacher (052)
Document Not Available from EDRS.
Descriptors—Course Descriptions, *Curriculum Development, Developed Nations, Developing Nations, Earth Science, *Ecology, Environmental Education, *Global Approach, Guidelines, Interdisciplinary Approach, Marine Biology, *Oceanography, *Science Education, *Science Instruction, *Secondary Education

Presented is a syllabus for introducing oceanography and the marine environment into the secondary school curricula of all IOC Member States, whether developed or developing. The main purpose of the syllabus is to promote an understanding of oceanography and the marine environment. The syllabus is action- and output-oriented, as well as comprehensive and multidisciplinary in approach. The topics take into consideration the varying conditions derived from geographical, cultural, social, and economic differences among the Member States. Included are: Man and the Sea; The Marine Environment; Energy and the Sea in Motion; Marine Ecosystems; Living Marine Resources - Use and Conservation; Non-living Marine Resources; Study of a Local Marine Problem; and Marine Pollution. Aims and objectives, a description of course content, methods, and resources needed are considered. (BT)

ED 190 368 **SE 031 312**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Student Guide: In Orbit. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—125p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Astronomy, *Energy, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, *Measurement, *Science Activities, Science Course Improvement Projects, Secondary Education, Secondary School Science, *Solar Radiation, Space Sciences
Identifiers—*Intermediate Science Curriculum Study

This is the student's text of one unit of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on the properties of sunlight, the use of spectrums and spectroscopes, the heat and energy of the sun, the measurement of astronomical distances, and the size of the sun. Activities are student-centered and intended for individualized instruction. The text is accompanied by illustrations. Excursions are provided as optional activities to allow the students to pursue a topic in greater depth. (SA)

ED 190 369 **SE 031 313**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Teacher's Edition: In Orbit. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—136p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—Astronomy, *Energy, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals,

*Laboratory Procedures. *Measurement. *Science Activities. Science Course Improvement Projects. Secondary Education. Secondary School Science. *Solar Radiation. Space Sciences
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on the properties of sunlight, the use of spectrums and spectroscopes, the heat and energy of the sun, the measurement of astronomical distances, and the size of the sun. Optimal excursions, in addition to the activities, are described for students who wish to study a topic in greater depth. An introduction describes light, inverse squares, orbits, and relativity in the sky. Illustrations accompany the text. (SA)

ED 190 370 **SE 031 314**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Student Guide: In Orbit. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—54p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Astronomy, *Energy, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Measurement, Records (Forms), Science Activities, Science Course Improvement Projects, Secondary Education, Secondary School Science, *Solar Radiation, Space Sciences, *Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book which accompanies the unit "In Orbit" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the student text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 371 **SE 031 315**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Teacher's Edition: In Orbit. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—55p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored graphs and print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Answer Sheets, Astronomy, *Energy, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Measurement, Records (Forms), Science Activities, Science Course Improvement Projects, Secondary Education, Secondary School Science, *Solar Radiation, Space Sciences, Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "In Orbit" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the text are recorded. An introductory note to the student explains how to use the book and is followed by the notes to the teacher. Answers are included to the activities and the excursions. A self evaluation section is included and followed by its answer key. (SA)

ED 190 372 **SE 031 316**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Student Guide: Crusty Problems. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—211p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC09 Plus Postage.
Descriptors—*Geology, Grade 9, Individualized Instruction, *Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Natural Resources, *Problem Solving, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science
Identifiers—*Intermediate Science Curriculum Study

This is the student's text for one of the units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The chapters contain basic information on the processes that shape the earth, activities related to the subject, and optional excursions. A section of introductory notes to the student discusses how to use the book and how the class will be organized. Illustrations accompany all instructions and the students are encouraged to select proper equipment based on the illustrations. (SA)

ED 190 373 **SE 031 317**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Teacher's Edition: Crusty Problems. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—225p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored and shaded photographs, drawings, and print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC09 Plus Postage.
Descriptors—*Geology, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, *Natural Resources, *Problem Solving, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on processes that shape the earth. Optional excursions, in addition to the activities, are suggested for students who wish to study an area in greater depth on an individualized basis. An introduction describes geologic time and preparation of laboratory equipment. Illustrations accompany the text. (SA)

ED 190 374 **SE 031 318**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Student Guide: Crusty Problems. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—52p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Geology, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Natural Resources, *Problem Solving, Records (Forms), Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book for the unit "Crusty Problems" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the text as well as for the optional excursions and the self evaluation. An introductory note to the student explains the use of the book. (SA)

ED 190 375 **SE 031 319**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Teacher's Edition: Crusty Problems. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—53p. For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Answer Sheets, *Geology, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Natural Resources, *Problem Solving, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "Crusty Problems" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the student text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and excursions. A self evaluation section is followed by its answer key. (SA)

ED 190 379 **SE 031 323**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Student Guide: Winds and Weather. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—180p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC08 Plus Postage.
Descriptors—*Climate, Environmental Influences, Grade 9, *Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Temperature, *Weather
Identifiers—*Intermediate Science Curriculum Study

This is the student's text of one of the units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The chapters contain basic information about weather, its measurement and predictions, activities related to the subject, and optional excursions. A section of introductory notes to the student discusses how to use the book and how the class will be organized. Data tables within the workbook format indicate where responses are expected. Illustrations accompany all instructions and the students are expected to select the proper equipment based on the illustrations. (SA)

ED 190 380 SE 031 324

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Teacher's Edition: Winds and Weather. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—187p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC08 Plus Postage.

Descriptors—*Climate, Environmental Influences, Grade 9, *Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Temperature, *Weather

Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of one of eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit focuses on weather, its measurement and prediction. Optional excursions are given for students who wish to study a topic in greater depth on an individualized basis. An introduction describes the energy for weather processes and the distribution of energy throughout the world. Illustrations accompany the text. (SA)

ED 190 381 SE 031 325

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Record Book, Student Guide: Winds and Weather. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—66p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Climate, Environmental Influences, Grade 9, *Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, Records (Forms), Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Temperature, *Weather, *Worksheets

Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book for "Winds and Weather" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 382 SE 031 326

Bonar, John R., Ed. Hathway, James A., Ed.

Probing the Natural World, Level III, Record Book, Teacher's Edition: Winds and Weather. Intermediate Science Curriculum Study.

Florida State Univ., Tallahassee. Dept. of Science Education.

Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.

Pub Date—72

Note—67p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored print which may not reproduce well.

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01/PC03 Plus Postage.

Descriptors—*Answer Sheets, *Climate, Environmental Influences, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, Laboratory Manuals, *Laboratory Procedures, Records (Forms), Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Temperature, *Weather, Worksheets

Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "Winds and Weather" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the student text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and excursions. A self evaluation section is followed by its answer key. (SA)

ED 190 400 SE 031 493

Jones, Michael

Limnology. Student Fieldbook.

Nebraska State Dept. of Education, Lincoln. Div. of Instructional Services.

Pub Date—77

Note—56p.; Not available in hard copy due to copyright restrictions.

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Environmental Education, Higher Education, Instructional Materials, *Laboratory Manuals, *Outdoor Activities, Science Education, *Science Experiments, Secondary Education, *Water Resources

Identifiers—*Limnology, Water Quality

This student fieldbook provides exercises for a three-week course in limnology. Exercises emphasize applications of knowledge in chemistry, physics, and biology to understand the natural operation of freshwater systems. Fourteen field exercises include: (1) testing for water quality; (2) determination of water temperature, turbidity, dissolved oxygen, carbon dioxide, alkalinity, acidity pH, phosphates, nitrates; (3) sampling at shoreline, in open water, and bottom mud, and (4) examination of samples at those levels. Notes for four telelessons, data tables, and apparatus diagrams are also included. (CS)

ED 194 302 SE 032 766

Meyland, Sarah J.

It's Only a Little Planet: A Primer for Ocean Studies.

Texas A and M Univ., College Station. Sea Grant Coll. Program.

Report No.—TAMU-SG-79-404

Pub Date—Sep 78

Note—81p.; Not available in hard copy due to copyright restrictions.

Available from—Sea Grant College Program, Texas A&M University, College Station, TX 77843 ($5.00).

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Chemistry, Ecology, *Environmental Education, *Field Trips, Higher Education, *Marine Biology, *Oceanography, *Outdoor Education, Science Education, Science Equipment, *Secondary School Science

Developed as part of the Day on the Bay Cruise Program, funded by the National Sea Grant Program, this learner's manual outlines ocean studies conducted on a seven-hour cruise of the Galveston Bay area. A description of the geology and human use of Galveston Bay follows a general introduction to coastal and estuarine ecology. Line drawings illustrate plankton and fish common to the study area. Also explained is the operation of the gravity corer, plankton net, reversing thermometer, otter trawl, and other gear employed in the cruise investigations. In addition, the guide discusses both theory and techniques of salinity and dissolved oxygen determination. A glossary defines frequently-used terms. (WB)

ED 194 325 SE 033 147

Rawson, Mac Trussell, Gale

Alabama 4-H Marine Pilot Manual.

Auburn Univ., Ala. Cooperative Extension Service.; Mississippi-Alabama Sea Grant Consortium, Ocean Springs, Miss.

Spons Agency—Extension Service (DOA), Washington, D.C.; National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.

Report No.—MASGP-78-024

Pub Date—Aug 78

Grant—NOAA-04-7-158-44017

Note—43p.; Contains occasional light and broken type.

Available from—National Technical Information Service, Operations Div., Springfield, VA 22161 (Order No. PB-287 924/5WF, $6.00).

Pub Type— Guides - Classroom - Learner (051)

EDRS Price - MF01/PC02 Plus Postage.

Descriptors—*Ecology, Environmental Education, *Marine Biology, *Oceanography, *Outdoor Education, Secondary Education, *Secondary School Science

Identifiers—*Marine Education

Brief descriptions and eight activities related to zooplankton, sharks, dune ecology, ocean currents, and sea products comprise this manual. Among the activities are harvesting seafood, making Japanese fish prints, and tracing marine currents with drift bottles. (WB)

ED 196 702 SE 033 646

Flowers, John D.

Making Water Pollution a Problem in the Classroom Through Computer Assisted Instruction.

Pub Date—Oct 80

Note—20p.; Paper presented at the Annual Convention of the National Association of Biology Teachers (Boston, MA, October 23-26, 1980).

Pub Type— Guides - Classroom - Teacher (052) — Speeches/Meeting Papers (150)

EDRS Price - MF01/PC01 Plus Postage.

Descriptors—*Computer Assisted Instruction, Computer Programs, Educational Methods, *Instructional Materials, *Problem Solving, *Programed Instruction, Science Activities, Science Education, *Secondary Education, Secondary School Science, *Water Pollution

Alternative means for dealing with water pollution control are presented for students and teachers. One computer oriented program is described in terms of teaching wastewater treatment and pollution concepts to middle and secondary school students. Suggestions are given to help teachers use a computer simulation program in their classrooms. Formulating hypotheses, identifying and manipulating variables, analyzing computer generated data tables, and graphic displays are described with regard to problem solving. (Author/CO)

Secondary

Energy

ED 101 959 **SE 018 625**
Jamason, Barry W.
Living Within Our Means: Energy and Scarcity. Environmental Education Instructional Activities 7-12.
New York State Education Dept., Albany. Office of Instructional Services.
Pub Date [74]
Note—112p.; For the K-6 booklet, see ED 093 673
EDRS Price MF-$0.76 HC-$5.70 PLUS POSTAGE
Descriptors—Conservation Education, *Energy, *Environmental Education, Fuel Consumption, Instructional Materials, Interdisciplinary Approach, Language Arts, *Learning Activities, Natural Resources, Objectives, Science Education, Sciences, *Secondary Grades, Social Studies, *Teaching Guides

This manual is a source of learning activities and instructional materials for teaching environmental education concepts in grades 7-12. Contents are organized into the areas of consumer education, English language arts, home economics, mathematics, science and social studies, and are subdivided by suggested grade level or subject area where applicable. Supplementary activities are included. An appendix containing reference books and articles, periodicals, films and multimedia materials concludes this manual. (BT)

ED 107 517 **SE 019 206**
Hogerton, John F.
Atomic Fuel, Understanding the Atom Series. Revised.
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information.
Pub Date 64
Note—46p.
Available from—USAEC Technical Information Center, P. O. Box 62, Oak Ridge, TN 37830
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—Economics, *Energy, *Fuels, Natural Resources, *Nuclear Physics, Pollution, Production Techniques, Radiation, Radioisotopes, Scientific Research, Utilities, Waste Disposal, Wastes
Identifiers—AEC, Atomic Energy Commission, *Nuclear Energy, Power Plants

This publication is part of the "Understanding the Atom" series. Complete sets of the series are available free to teachers, schools, and public librarians who can make them available for reference or use by groups. Among the topics discussed are: What Atomic Fuel Is; The Odyssey of Uranium; Production of Uranium; Fabrication of Reactor Fuel Elements; Processing of Spent Fuel; The Cost of Atomic Fuel; Atomic Fuel as an Energy Resource; and Atomic Fuel Utilization. A listing of books, reports, articles and motion pictures related to atomic fuels is included. (BT)

ED 107 518 **SE 019 207**
Hogerton, John F.
Atomic Power Safety.
Atomic Energy Commission, Washington, D. C. Office of Information Services.
Pub Date 64
Note—48p.
Available from—USAEC Technical Information Center, P. O. Box 62, Oak Ridge, TN 37830 (cost to the general public for 1-4 copies, $0.25 ea., 5-99, $0.20 ea., 100 or more, $0.15 ea.)
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—*Energy, Environment, *Nuclear Physics, Physics, Radiation, Radioisotopes, *Safety, Scientific Research, *Utilities
Identifiers—AEC, Atomic Energy Commission, *Nuclear Energy, Power Plants

This publication is one of a series of information booklets for the general public published by The United States Atomic Energy Commission. Among the topics discussed are: What is Atomic Power?; What Does Safety Depend On?; Control of Radioactive Material During Operation; Accident Prevention; Containment in the Event of an Accident; Licensing and Regulation of Atomic Power Plants; The Experience Record; Safety Research; and Additional Information on Atomic Power. Schools and public libraries may obtain a complete set of the booklets without charge. (BT)

ED 107 519 **SE 019 208**
A Bibliography of Basic Books on Atomic Energy. Update.
Atomic Energy Commission, Washington, D. C. Office of Information Services.
Pub Date 74
Note—79p.; see ED 059 896 for an earlier edition
Available from—USAEC Technical Information Center, P. O. Box 62, Oak Ridge, TN 37830
EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE
Descriptors—*Annotated Bibliographies, *Bibliographies, *Booklists, Elementary School Science, *Government Publications, *Nuclear Physics, Physics, Resource Materials, Science Education, Secondary School Science
Identifiers—AEC, *Atomic Energy Commission, Nuclear Energy

This booklet, part of the United States Atomic Energy Commission's series of information booklets, lists selected commercially published books for the general public on atomic energy and closely related subjects. It includes annotated bibliographies for children (grade level indicated) and adults. The books are arranged by subject, alphabetized by title and also indexed by author. A list of publisher addresses is included along with a brief introduction to library usage. The booklet is illustrated with photographs of nuclear physicists, research installations, and some applications of nuclear energy. (BT)

ED 107 520 **SE 019 209**
Glasstone, Samuel
Controlled Nuclear Fusion.
Atomic Energy Commission, Washington, D. C. Office of Information Services.
Pub Date 74
Note—95p.
Available from—USAEC Technical Information Center, P. O. Box 62, Oak Ridge, TN 37830
EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE
Descriptors—*Energy, *Nuclear Physics, Physics, Radioisotopes, *Scientific Research
Identifiers—AEC, Atomic Energy Commission, Nuclear Reactors

This publication is one of a series of information booklets for the general public published by The United States Atomic Energy Commission. Among the topics discussed are: Importance of Fusion Energy; Conditions for Nuclear Fusion; Thermonuclear Reactions in Plasmas; Plasma Confinement by Magnetic Fields; Experiments With Plasmas; High-Temperature Plasma Studies; Nuclear Fusion Reactors With Magnetic Confinement; Inertial Confinement; and Nuclear Fusion Research Programs. A reading list and free-loan film list are included. Schools and public libraries may obtain the booklets without charge. (BT)

ED 107 521 **SE 019 210**
Corliss, William R.
Direct Conversion of Energy.
Atomic Energy Commission, Washington, D. C. Office of Information Services.
Pub Date 64
Note—41p.
Available from—USAEC Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830 (cost to the general public for 1-4 copies, $0.25 ea., 5-99, $0.20 ea., 100 or more, $0.15 ea.)
EDRS Price MF-$0.76 HC-$1.95 PLUS POSTAGE
Descriptors—Electricity, Electronics, *Energy, Nuclear Physics, Physics, *Scientific Research, *Thermodynamics
Identifiers—AEC, Atomic Energy Commission

This publication is one of a series of information booklets for the general public published by the United States Atomic Energy Commission. Direct energy conversion involves energy transformation without moving parts. The concepts of direct and dynamic energy conversion plus the laws governing energy conversion are investigated. Among the topics discussed are: Thermoelectricity; Thermionic Conversion; Magnetohydrodynamic Conversion; Chemical Batteries; The Fuel Cell; Solar Cells; Nuclear Batteries; Ferroelectric Conversion and Thermomagnetic Conversion. Five problems related to the reading material are included. A list of suggested references concludes this report. A complete set of these booklets may be obtained by school and public libraries without charge. (BT)

ED 107 522 **SE 019 211**
Lyerly, Ray L. Mitchell, Walter, III
Nuclear Power Plants. Revised.
Atomic Energy Commission, Washington, D. C. Office of Information Services.
Pub Date 73
Note—62p.
Available from—USAEC Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—Economics, Electricity, *Energy, *Nuclear Physics, Physics, Radiation, Scientific Research, *Utilities
Identifiers—AEC, Atomic Energy Commission, Nuclear Reactors, *Power Plants

This publication is one of a series of information booklets for the general public published by the United States Atomic Energy Commission. Among the topics discussed are: Why Use Nuclear Power?; From Atoms to Electricity; Reactor Types; Typical Plant Design Features; The Cost of Nuclear Power; Plants in the United States; Developments in Foreign Countries; and The Last Word. A list of suggested references, including books, reports, articles, and motion pictures, is included. School and public libraries may obtain a complete set of booklets without charge. (BT)

ED 107 523 **SE 019 212**
Hogerton, John F.
Nuclear Reactors. Revised.
Atomic Energy Commission, Oak Ridge, Tenn. Div. of Technical Information.
Pub Date 70
Note—61p.
Available from—USAEC Technical Information Center, P. O. Box 62, Oak Ridge, TN 37830
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—Electricity, *Energy, *Nuclear Physics, Oceanology, Physics, Safety, *Scientific Research, Utilities
Identifiers—AEC, Atomic Energy Commission, Nuclear Reactors

This publication is one of a series of information booklets for the general public published by the United States Atomic Energy Commission. Among the topics discussed are: How Reactors Work; Reactor Design; Research, Teaching, and Materials Testing; Reactors (Research, Teaching and Materials); Production Reactors; Reactors for Electric Power Generation; Reactors to Supply Heat; Reactors at Sea; Reactors in Space, Reactor Safety; and Reactors of Tomorrow. The appendix contains a list of United States Central Station Nuclear Power Projects that are operable, being built, or planned as of June 1970. A list of suggested references, including books, reports, articles, and motion pictures, is included. School and public libraries may obtain a complete set of the booklets without charge. (BT)

ED 107 524 **SE 019 213**
Fox, Charles H.
Radioactive Wastes. Revised.
Atomic Energy Commission, Washington, D. C. Office of Information Services.

Pub Date 69

Note—52p.

Available from—USAEC Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830 (cost to the general public for 1-4 copies, $0.25 ea., 5-99, $0.20 ea., 100 or more, $0.15 ea.)

EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE

Descriptors—*Environment, Natural Resources, *Nuclear Physics, Physics, Pollution, Radiation, *Radioisotopes, Scientific Research, *Waste Disposal, *Wastes

Identifiers—AEC, Atomic Energy Commission, Radioactivity

This publication is one of a series of information booklets for the general public published by the United States Atomic Energy Commission. This booklet deals with the handling, processing and disposal of radioactive wastes. Among the topics discussed are: The Nature of Radioactive Wastes; Waste Management; and Research and Development. There are four appendices which list: Naturally Occurring Radioisotopes Encountered in Mining, Milling, and Fuel Preparation in the Uranium Fuel Cycle; Principle Fission-product Radioisotopes in Radioactive Wastes; Principle Activation-product Radioisotopes Produced by Neutron Irradiation of Nonfuel Materials; and a List of Firms Licensed to Receive and Dispose of Radioactive Wastes. A list of suggested references at the popular and technical level, including books, reports, articles, and motion pictures, is included. Schools and public libraries may obtain a complete set of the booklets without charge. (BT)

ED 119 942 RC 009 094

Coombs, Philip H. And Others

New Paths to Learning for Rural Children and Youth: Nonformal Education for Rural Development.

International Council for Educational Development, New York, N.Y.

Pub Date Oct 73

Note—133p.

Available from—International Council for Educational Development, 680 Fifth Avenue, New York, New York 10019 ($2.00)

Document Not Available from EDRS

Descriptors—Case Studies, *Developing Nations, Educational Alternatives, Educational Objectives, Guidelines, *Needs Assessment, *Nonformal Education, *Out of School Youth, Program Descriptions, *Rural Development

Designed to provide developing nations and government agencies with information on nonformal education, this study presents general guidelines on how to: (1) assess the needs within a given country for rural children and youth, (2) plan effective/economic programs to meet these needs, (3) develop means to evaluate and strengthen such programs, and (4) define the ways in which external agencies can be of the greatest help in program implementation. Limited in scope to nonformal education, out-of-school youth and children, and rural areas of developing nations, the study's data are derived from 12 case studies (11 countries) of nonformal education programs and discussions with knowledgeables in developing countries, government agencies, research institutions, etc. Constituting the core of evidence, the case studies are presented in terms of: (1) a general diagnosis of rural educational needs viewed in a broad social-economic context, (2) an inventory/assessment of existing nonformal education programs addressed to rural children/youth, (3) fuller analysis of selected programs appearing to offer significant lessons for other countries, and (4) critical assessment of both positive and negative program experiences. This report also identifies fundamental concepts, present patterns, critical issues, and the means by which nonformal education programs can be activated. (JC)

ED 127 161 SE 021 181

A Teacher's Introduction to Energy and Energy Conservation: Secondary.

Battelle Memorial Inst., Columbus, Ohio. Center for Improved Education.; Ohio State Dept. of Education, Columbus.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 75

Note—97p.; For related document, see SE021180; Photographs may not reproduce well

Available from—Division of Education Redesign and Renewal, Ohio Dept. of Education, 65 South Front St., Columbus, Ohio 43215 (no price quoted)

EDRS Price MF-$0.83 HC-$4.67 Plus Postage.

Descriptors—Curriculum, *Energy, *Energy Conservation, Instructional Materials, *Physics, Science Education, Secondary Education, *Secondary School Science, *Teaching Guides

Identifiers—*Ohio

This document is intended to give the secondary school teacher background information and general suggestions for teaching units and correlated learning activities related to energy and energy conservation. Sections are directed to: A Problem Shared by All, Causes, What is Energy?, Energy Sources, Searching for Solutions, Conservation: An Ethic for Everyone, a glossary, and an extensive bibliography. (MH)

ED 129 677 SO 009 452

LaHart, David E. Allen, Rodney F.

Implementing Energy Education in Florida's High Schools: A Two-Week Credit Institute for Teachers in North Florida. Final Report, Volume II.

Florida State Univ., Tallahassee. Environmental Education Project.

Spons Agency—Energy Research and Development Administration, Washington, D.C.

Pub Date Sep 76

Contract—E-40-1-5120

Note—102p.

EDRS Price MF-$0.83 HC-$6.01 Plus Postage.

Descriptors—Conservation Education, *Curriculum, Elementary Secondary Education, *Energy, Energy Conservation, *Environmental Education, Home Economics, *Learning Activities, Science Units, Simulation, Social Studies Units, *Teacher Developed Materials, *Unit Plan

Curriculum units developed by high school teachers are provided for specific content instruction in energy education. Based on group agreement that energy education should assist students in changing attitudes, altering personal behavior and energy consumption, and developing sound alternatives, the units are categorized by social studies, science, and home economics. The social studies units begin with several activities involving energy vocabulary terms. For example, crossword puzzles and bingo games reinforce definitions. A week-long simulation game based on political decision making creates awareness of energy allocation problems in terms of such issues as litter clean-up, new housing developments, and public swimming pools. The science units focus on the technology of biological and physical energy systems. Debates about different types of energy use are encouraged, and laboratory projects such as the construction of a solar biogenerator are encouraged. In the home economics units, students learn methods of energy conservation in family life and personal values. Carefully planned house construction, insulation, and use of shrubbery are seen to reduce energy consumption in all seasons. Making hot pads out of a discarded quilt is one of several suggestions for recycling household materials. (AV)

ED 133 162 SE 021 477

Parr, Donald

Energy Futures... [Project ECOLogy ELE Pak, Parr Pak].

Highline Public Schools, Seattle, Wash.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date [76]

Note—58p.; For related documents, see SE 021 438-478; Contains occasional light type

Available from—Highline Public Schools, Instructional Division, Project ECOLogy ESEA Title III, Bill Guise, Director, 15675 Ambaum Blvd., S.W., Seattle, WA 98166 ($2.50)

EDRS Price MF-$0.83 HC-$3.50 Plus Postage.

Descriptors—Conservation Education, *Energy, Environment, *Environmental Education, *Instructional Materials, Junior High School Students, *Natural Resources, *Secondary School Science, *Units of Study (Subject Fields)

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This is one of a series of units for environmental education developed by the Highline Public Schools. This unit on energy is designed for junior high school science students. The 11 concepts of the unit have been developed into 11 lessons that should take from two to three weeks to complete. Each lesson includes the concept of the lesson, materials needed, notes to the teacher, procedure, evaluative activities and suggested additional activities. (RH)

ED 137 075 SE 022 012

Terry, Mark Witt, Paul

Energy and Order or If You Can't Trust the Law of Conservation of Energy, Who Can You Trust?

Friends of the Earth Foundation, San Francisco, Calif.

Pub Date 76

Note—47p.; Not available in hard copy due to copyright restrictions

Available from—Friends of the Earth, 124 Spear Street, San Francisco, CA 94105 (no price quoted)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Energy, *Environment, *Instructional Materials, *Natural Resources, Secondary Education, *Secondary School Science, *Teaching Guides

This instructional program is designed to be used with grade 10 students for 4 to 5 weeks to help students to predict what will happen in a given energy situation. It is designed to lead students to an understanding of their personal energy use, to a realization of the moral nature of the assumptions underlying energy decisions, and to a belief that they can and should participate in decisions affecting their lives. Materials include: (1) Understanding Energy and Order - An Activity; (2) Energy and Order Primer - Presentation; (3) The Nuclear Accident - Presentation; (4) The Automobile Accident - Presentation; (5) The Population Accident - Presentation; (6) Understanding What's on the Bill - An Activity; (7) Understanding What's in the Container - An Activity; (8) The Green Revolution - Presentation; and (9) What's Keeping Us - Presentation. (RH)

ED 141 163 SE 022 685

Energy for 1970-1990. A Learning Experience for Coastal and Oceanic Awareness Studies, No. 315. [Project COAST].

Delaware Univ., Newark. Coll. of Education.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 74

Note—22p.; For related documents, see SE 022 662-687

EDRS Price MF-$0.83 HC-$1.67 Plus Postage.

Descriptors—*Energy, Environment, *Instructional Materials, Natural Resources, *Sciences, *Secondary Grades, *Social Studies, *Teaching Guides, Units of Study

Identifiers—Project COAST

This learning experience is designed to be used as a short introduction to energy studies. Included are background material (to be read by students), classroom discussion ideas, classroom activity (teacher's guide and student worksheet), and selected references. (RE)

ED 162 851 SE 025 230

Norton, Thomas W. And Others

Solar Energy Experiments for High School and College Students.

Pub Date—77

Note—1[illegible]1p.; Not available in hard copy due to copyright restrictions

Available from—Rodale Press, inc., 33 E. Minor Street, Emmaus, PA 18049 ($5.95)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—College Science, Energy, *Environmental Education, Experiential Learning, *Instructional Materials, Laboratory Manuals, Physics Experiments, Science Education, *Science Experiments, *Secondary School Science, *Solar Radiation

This publication contains eighteen experiments and eight classroom activities. The experiments are of varying difficulty and cover the important aspects of solar energy utilization. Each experiment is self-contained, with its own introduction and background information. Energy measurements are emphasized and techniques for collector efficiency determinations are considered. Among the topics discussed are: (1) altitude and azimuth of the sun; (2) radiation characteristics; (3) energy collection with converging lenses; (4) air and water solar collectors; and (5) energy storage in gravel beds and in salt hydrates. Both theoretical and practical engineering considerations are illustrated by the experiments. Many experiments are directly applicable to existing physics, general science, and environmental science curricula, while others are of sufficient difficulty and duration to challenge college and the most advanced secondary students. The eight classroom activities present worldwide energy data and solar energy data for individual student analysis. This manual can serve as a useful classroom resource as well as a general reference. (Author/MR)

ED 162 886 SE 025 390

An Educator's Introduction to Energy Concepts: Overview Packets.

Maine Audubon Society, Falmouth.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date—Nov 77

Grant—G007602036

Note—68p.; Pages 9, 10 of "Consumption Lifestyles" section removed due to copyright restrictions; Not available in hard copy due to marginal legibility of original document

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—Conservation (Environment), *Energy Conservation, *Environmental Education, Information Sources, Instructional Materials, Natural Resources, Physics, Social Studies, *Sociocultural Patterns, *Teaching Guides

Identifiers—*Energy Education

This publication provides a broad overview of energy and related issues for teachers and others who want to improve their understanding of these issues. Included in this publication are discussions of: (1) elementary physics related to energy; (2) energy sources, including topics such as renewable and non-renewable resources and fossil fuels; (3) energy uses in the U.S.; (4) thermodynamics; (5) space heating; (6) energy conservation; and (7) socioeconomic aspects of the energy crisis. The last section entitled Consumption/Life Style is designed for social science teachers and discusses the effects of population increases on natural resources and social values. Diagrams and tables are provided to illustrate, among other things: (1) energy consumption rates of various electric appliances; (2) energy uses by economic sector; (3) U.S. energy flow from source to work and waste; and (4) the flow of energy to and from earth. (MR)

ED 166 009 SE 025 393

Jones, John, Ed.

Energy and Man's Environment: Activity Guide. An Interdisciplinary Teacher's Guide to Energy and Environmental Activities.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—76

Note—36p.; For related documents, see SE 025 394-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—Activity Units, *Conceptual Schemes, Curriculum Development, Energy, *Energy Conservation, *Environmental Education, Experiential Learning, *Instructional Materials, Interdisciplinary Approach, *Objectives

This publication provides the goals, concepts, objectives, and rationale for the six activity guides in this series of energy education materials. The organization of this series, as presented in this publication, centers around six goals which correspond to the activity guides. Under each goal are several concepts, which in turn, have several objectives. These concepts and goals are referenced above the activities included in the guides. The six goals are: (1) It is essential that each person know that there are many sources of energy; (2) It is essential that each person know that people are dependent upon energy; (3) It is essential that each person know that energy can be converted from one form to another; (4) It is essential that each person know how man's use of energy creates an impact on the environmental and economic systems; (5) It is essential that each person know that the earth's resources are limited; and (6) It is essential that each person know that new energy sources and more efficient systems, accompanied by different consumption practices, may alter the world energy dilemma. This conceptual outline may be of use to teachers, curriculum specialists, and researchers. (MR)

ED 166 010 SE 025 394

Jones, John, Ed.

Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section One - Sources of Energy.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—76

Note—44p.; For related documents, see SE 025 393-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Activities, Activity Units, Conceptual Schemes, Energy, *Energy Conservation, *Environmental Education, Instructional Materials, *Interdisciplinary Approach, Junior High Schools, Middle Schools, Natural Resources, *Objectives

Identifiers—*Energy Education

This publication presents the activities pertaining to the first goal of this activity guide series. The activities in this publication focus primarily on the availability of resources, forms of energy, natural laws, and socioeconomic considerations. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in a variety of ways. The activities are simply ideas of things that students can do to help them understand the concepts. It has been left to the teacher to choose and implement these ideas as desired. Activities range from an energy unit "treasure hunt" to dramatizing an Inca coronation. (MR)

ED 166 011 SE 025 395

Jones, John, Ed.

Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Two - Uses of Energy.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—[illegible]

Note—56p.; For related docments, see SE 025 393-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Activities, Activity Units, Conceptual Schemes, *Conservation (Environment), *Energy Conservation, Environmental Education, Instructional Materials, Interdisciplinary Approach, *Junior High Schools, *Middle Schools, *Objectives

This publication presents the activities pertaining to the second goal of this activity guide series. The activities in this publication focus primarly on awareness, conservation, and planning. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things that students can do to help them understand the concepts. It has been left for the teacher to choose and implement these ideas as desired. Activities range from writing a story that details the impact on members of a food chain when one member is removed to conducting a community survey to determine how people are trying to conserve energy. (MR)

ED 166 012 SE 025 396

Jones, John, Ed.

Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Three - Conversion of Energy.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—76

Note—55p.; For related documents, see SE 025 393-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Activities, Activity Units, Conceptual Schemes, *Decision Making Skills, *Energy Conservation, Environmental Education, Instructional Materials, *Interdisciplinary Approach, *Junior High Schools, *Middle Schools, Objectives

This publication presents the activities pertaining to the third goal of this activity guide series. The activities in this publication focus on understanding conservation processes, efficiencies, socioeconomic costs, and personal decision-making. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things that students can do to help them understand the concepts. It remains for the teacher to choose and implement these ideas as desired. Activities range from stating the first and second laws of thermodynamics so the students' parents can understand them to designing a house which runs entirely on solar energy. (MR)

ED 166 013 SE 025 397

Jones, John, Ed.

Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Four - Impacts of Energy.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—76

Note—83p.; For related documents, see SE 025 393-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Activities, Conceptual Schemes, *Energy Conservation, Environmental Education, Instructional Materials, *Interdisciplinary Approach, *Junior High Schools, *Middle Schools, Objectives, *Socioeconomic Influences

This publication presents the activities pertaining to the fourth goal of this activity guide series. The activities in this publication focus on the socioeconomic effects of energy uses and crises and the understandings needed to assess those effects. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in many ways. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to choose and implement those ideas as desired. Activities range from an experiment measuring sulphur dioxide in automobile exhaust to mapping the major sea lanes between oil producing countries and oil importing countries. (MR)

ED 166 014 SE 025 398

Jones, John, Ed.

Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Five - Limits of Energy.

Energy and Man's Environment, Inc., Portland, Oreg.

Pub Date—76

Note—50p.; For related documents, see SE 025 393-399; Not available in hard copy due to copyright restrictions

Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)

EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.

Descriptors—*Activities, Conceptual Schemes, *Energy Conservation, *Environmental Education, High Schools, Instructional Materials, *Interdisciplinary Approach, *Junior High Schools, Middle Schools, Objectives, *Policy Formation

This publication presents the activities pertaining to the fifth goal of this activity guide series. The activities in this publication relate to understanding nature and the natural limits to growth, personal consumption practices, and the social and technological implications of rapidly depleting the world's natural resources. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary and can be used in a variety of ways. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to choose and implement these ideas as desired. Activities range from writing a story explaining what the earth's energy resources will be like by the year 2000 to role playing an election to illustrate how the class can get their views into the government. Some of these activities may be suitable for high school students as well. (MR)

ED 166 015 **SE 025 399**
Jones, John, Ed.
Energy and Man's Environment Activity Guide: An Interdisciplinary Teacher's Guide to Energy and Environmental Activities, Section Six - Future Sources of Energy.
Energy and Man's Environment, Inc., Portland, Oreg.
Pub Date—76
Note—43p.; For related documents, see SE 025 393-398; Not available in hard copy due to copyright restrictions
Available from—Energy and Man's Environment, 0224 SW Hamilton, Suite 301, Portland, OR 97201 ($25.00 a set)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Activities, Conceptual Schemes, *Energy Conservation, *Environmental Education, Instructional Materials, Interdisciplinary Approach, *Junior High Schools, *Middle Schools, Objectives, *Technology

This publication presents the activities pertaining to the sixth goal of this activity guide series. The activities in this publication relate principally to the more advanced technologies and the implications of their development. These materials are appropriate for middle school and junior high school students. These activities, organized by objective under the concepts listed, are interdisciplinary. The activities are simply ideas of things students can do to help them understand the concepts. It remains for the teacher to use these ideas as desired. Activities range from preparing and delivering an energy briefing to the class using the style of Walter Cronkite and information collected from the news media to listing the various kinds of educational requirements needed to pursue a career in technology. (MR)

ED 173 158 **SE 028 406**
Tullock, Bruce, Ed. And Others
Solar Energy Project: Teacher's Guide.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0060
Pub Date—Jan 79
Note—45p.; For related documents, see SE 028 407-413
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-0023[illegible]-1; $2.20)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Energy, Environmental Education, Interdisciplinary Approach, *Science Curriculum, *Science Education, *Science Instruction, Science Programs, Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—*Energy Education, *Solar Energy

This collection of materials supports the teaching of solar energy concepts in the context of secondary school science. Included in this collection are a basic teacher's guide to activities involved in the curriculum, a discussion of multi-disciplinary extensions of solar energy education by subject area, a section on hardware needed for the curriculum; and a section of resources and references. (RE)

ED 173 159 **SE 028 407**
Tullock, Bruce, Ed. And Others
Solar Energy Project, Activities: Junior High Science.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0062
Pub Date—Jan 79
Note—114p.; For related documents, see SE 028 406-413
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00228-6; $2.75)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Class Activities, *Energy, Environmental Education, Junior High Schools, *Lesson Plans, *Science Curriculum, *Science Education, Science Experiments, *Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This guide contains lesson plans and outlines of science activities which present concepts of solar energy in the context of the junior high science curriculum. Each unit presents an introduction; objectives; skills and knowledge needed; materials; methods; questions; recommendations for further work; and a teacher information sheet. The teacher information sheet presents the target grade levels; the areas of science involved in the lesson; background information; hints on gathering materials; suggested time allotment; suggested approach; typical results; precautions; modifications; and evaluation. (RE)

ED 173 160 **SE 028 408**
Tullock, Bruce, Ed. And Others
Solar Energy Project, Activities: Earth Science.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0063
Pub Date—Jan 79
Note—88p.; For related documents, see SE 028 406-413
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00232-4; $2.75)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Earth Science, *Energy, Environmental Education, *Lesson Plans, Meteorology, Science Curriculum, *Science Education, *Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This guide contains lesson plans and outlines of science activities which present concepts of solar energy in the context of earth science experiments. Each unit presents an introduction; objectives; skills and knowledge needed; materials; method; questions; recommendations for further study; and a teacher information sheet. The teacher information sheet includes suggested grade level; additional subject areas involved; background information; hints on gathering materials; suggested time allotment; suggested approach; typical results; precautions; modifications; evaluations; and references. (RE)

ED 173 161 **SE 028 409**
Tullock, Bruce, Ed. And Others
Solar Energy Project, Activities: Biology.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0065
Pub Date—Jan 79
Note—36p.; For related documents, see SE 028 406-413; Contains occasional light type
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00230-8; $1.70)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Biology, *Earth Science, Ecology, *Energy, *Lesson Plans, *Science Curriculum, *Science Education, Science Experiments, Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This guide contains lesson plans and outlines of science activities which present concepts of solar energy in the context of biology experiments. Each unit presents an introduction; objectives; skills and knowledge needed; materials; methods; questions; recommendations for further work; and a teacher information sheet. The teacher information sheet provides the target grade level; additional subject areas involved; background information; hints on gathering materials; suggested time allotment; suggested approach; typical results; precautions; modifications; evaluation; and references. (RE)

ED 173 162 **SE 028 410**
Tullock, Bruce, Ed. And Others
Solar Energy Project, Activities: Chemistry & Physics.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0064
Pub Date—Jan 79
Note—58p.; For related documents, see SE 028 406-413; Contains occasional small, light and broken type
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00229-4; $2.20)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Chemistry, *Energy, Lesson Plans, *Physics, *Science Curriculum, *Science Education, Science Experiments, Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This guide contains lesson plans and outlines of science activities which present concepts of solar energy in the context of chemistry and physics experiments. Each unit presents an introduction to the unit; objectives; required skills and knowledge; materials; method; questions; recommendations for further work; and a teacher information sheet. The teacher information sheet contains information on the target grade levels; background information; hints on gathering materials; suggested time allotment; suggested approach; typical results; precautions; modifications; evaluation; and references. (RE)

ED 173 163 **SE 028 411**
Tullock, Bruce, Ed. And Others
Solar Energy Project, Activities: General Solar Topics.
Department of Energy, Washington, D.C.; New York State Education Dept., Albany. Bureau of Science Education.; State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0061
Pub Date—Jan 79
Note—79p.; For related documents, see SE 028 406-413
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00231-6; $2.50)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Class Activities, Ecology, Economics, *Energy, Environmental Education, History, *Lesson Plans, *Science Education, *Secondary Education, Social Studies, *Solar Radiation, *Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This guide contains lesson plans and outlines of activities which introduce students to concepts and issues relating to solar energy. Lessons frequently presented in the context of solar energy as it relates to contemporary energy problems. Each unit presents an introduction; objectives; necessary skills and knowledge; materials; method; questions; suggestions for further work; and a teacher information sheet. The teacher information sheet provides target grade level subject areas involved for the lesson and background material: hints on gathering materials for the lesson: suggested time allotment: suggested approach: typical results: precautions: modifications: evaluation: and references. (RE)

ED 173 164 SE 028 412
Tullock, Bruce, Ed. And Others
Solar Energy Project: Text.
Department of Energy, Washington, D.C.: New York State Education Dept., Albany. Bureau of Science Education.: State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0066
Pub Date—Jan 79
Note—106p.: For related documents, see SE 028 406-413
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00233-2: $2.75)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Curriculum Guides, *Earth Science, Ecology, *Electricity, *Energy, Environmental Education, Fuels, *Heating, *Science Education, Secondary Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—Energy Education, Solar Energy

The text is a compilation of background information which should be useful to teachers wishing to obtain some technical information on solar technology. Twenty sections are included which deal with topics ranging from discussion of the sun's composition to the legal implications of using solar energy. The text is intended to provide useful information to teachers at all levels of secondary education. Many advanced science teachers with competency in algebra may find the text useful. (Author/RE)

ED 173 165 SE 028 413
Tullock, Bruce, Ed. And Others
Solar Energy Project: Reader.
Department of Energy, Washington, D.C.: New York State Education Dept., Albany. Bureau of Science Education.: State Univ. of New York, Albany. Atmospheric Science Research Center.
Report No.—DOE-CS-0067
Pub Date—Jan 79
Note—115p.: For related documents, see SE 028 406-412; Photographs will not reproduce well; Best copy available
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 061-000-00235-9; $2.75)
Pub Type— Guides - Classroom - Learner (051) — Collected Works - General (020)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Ecology, Economics, *Energy, Environmental Education, *Reading Materials, Reference Materials, *Science Education, *Secondary Education, Social Studies, *Solar Radiation, *Technological Advancement, Technology
Identifiers—Energy Education, *Solar Energy

This document is designed to give both teachers and students the opportunity to review a variety of representative articles on solar energy. Consideration is given to the sun's role in man's past, present, and future. The present state of solar technology is examined theoretically, economically, and comparatively in light of growing need for alternatives in the situation of diminishing conventional energy supplies. (Author/RE)

ED 174 479 SE 028 615
Hack, Nancy And Others
Selected Energy Education Activities for Pennsylvania Middle School Grades. Draft.
Pennsylvania State Dept. of Education, Harrisburg.
Spons Agency—Governor's Energy Council, Harrisburg, Pa.
Pub Date—79
Note—108p.
Available from—The Pennsylvania State Univ., 336 Agricultural Administration, University Park, PA 16802 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Art Education, *Class Activities, *Elementary Secondary Education, *Energy, *Energy Conservation, *Environmental Education, Health Education, *Interdisciplinary Approach, Language Arts, Mathematics Education, Science Education, Social Studies
Identifiers—*Energy Education

These activities are intended to help increase awareness and understanding of the energy situation and to encourage students to become energy conservationists. The document is divided into sections according to discipline area. A final section is devoted to interdisciplinary activities involving several discipline areas integrated with the energy lesson. Each activity description contains: (1) discussion of grade level; (2) energy learning objective; (3) discipline area learning objective; (4) materials; (5) background information; (6) activity description; and (7) contact organizations for further assistance and information. (Author/RE)

ED 175 711 SE 028 749
Land, Amy A.
Energy Awareness: An Introduction to the Energy Situation.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-32
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—17p.; For related documents, see SE 028 747-757
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—*Current Events, Curriculum Planning, *Energy, *Energy Conservation, *Interdisciplinary Approach, Natural Resources, Secondary Education
Identifiers—*Energy Education, Mississippi

This unit presents a five-day series of classroom activities designed to help students become more aware of the energy situation and their individual responsibilities toward it. Each day's lesson includes: (1) activity title; (2) motivational hints; (3) objectives; (4) materials needed; and (5) description of the activity. A list of resource materials and their sources is provided. (Author/RE)

ED 175 712 SE 028 750
Land, Amy A.
Energy Conservation.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-33
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—27p.; For related documents, see SE 028 747-757; Contains occasional light type
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Conservation (Environment), *Curriculum Planning, *Energy, *Energy Conservation, *Environmental Education, Interdisciplinary Approach, Natural Resources, *Secondary Education
Identifiers—*Energy Education, Mississippi

This selection of class activities involves a sequence of 10 class sessions. The goal of the collection is to aid students in learning the concepts of energy conservation and to put this knowledge into practice. Attention is also given to the development of alternate energy sources. Each lesson includes an activity title, motivational hints, lesson purpose, materials needed, and instructions to students. A list of free and inexpensive resource materials and sources of them is provided at the end of the document. (RE)

ED 175 716 SE 028 754
Polk, Joyce
Solar Energy - Solution or Pipedream?
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-37
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—13p.; For related documents, see SE 028 747-757; Contains occasional light and broken type
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—Curriculum Planning, *Energy, *Energy Conservation, Environmental Education, *Science Education, *Secondary Education, *Solar Radiation
Identifiers—*Energy Education, Mississippi, *Solar Energy

This series of lessons and class activities is designed for presentation in a sequence of nine class days. The collection is intended to provide the student in advanced science classes with awareness of the possibilities and limitations of solar energy as a potential solution to the energy crisis. Included are discussion of the following: (1) Solar energy variables (weather, geography, and day/night problems); (2) Characteristics of solar heating and cooling; (3) Construction of a solar collection; (4) Electrical production by solar cell; and (5) Characteristics of solar electrical production. (RE)

ED 175 717 SE 028 755
Williams, LaVora
My Very Own Contract About the Energy Crisis.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-38
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—14p.; For related documents, see SE 028 747-757; Contains occasional light and broken type
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—*Energy, *Energy Conservation, Interdisciplinary Approach, Junior High Schools, *Language Arts, *Science Education, Secondary Education, *Social Studies
Identifiers—*Energy Education, Mississippi

This collection of lessons and class activities is designed for presentation during a sequence of five class days. The lessons are intended to emphasize the need for energy conservation by everyone. Seventh grade students will be taught methods for acquainting others of the nature of the energy situation and methods of making their homes more energy efficient. A list of sources for free or inexpensive materials is provided in addition to the lessons. (RE)

ED 175 718 SE 028 756
Williams, LaVora
An Energy Encounter (An Energy Awareness Program).
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-39
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—29p.; For related documents, see SE 028 747-757
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Curriculum Planning, *Energy, *Energy Conservation, Interdisciplinary Approach, Junior High Schools, Nonformal Education, *Science Education, *Secondary Education
Identifiers—*Energy Education, Mississippi

This guide presents instructions for five class sessions on the preparation of an energy education program by students to the community. The energy education program is designed around a series of booths or activity centers devised and operated by seventh-grade students and set up within the classroom. A list of sources for free or inexpensive materials is provided. (RE)

ED 175 719 **SE 028 757**
Hudson, Paula
Students' Sympathetic Participation in the Energy Crisis.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-40
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—22p.; For related documents, see SE 028 747-757
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC01 Plus Postage.
Descriptors—*Curriculum Planning, *Energy, *Energy Conservation, *English, Junior High Schools, *Language Arts, Natural Resources, *Secondary Education
Identifiers—*Energy Educa[illegible] Mississippi

This collection of lessons involves a sequence of 10 class sessions to give above average seventh-grade students an opportunity to use verbal, research, and creative skills in discussing the energy situation as it applies to their lives. The practice of English skills is emphasized in the lessons. A list of sources of free or inexpensive materials is provided. (RE)

ED 179 374 **SE 028 822**
Brown, Evelyn And Others
Energy Transitions in U.S. History, Grades 8-9. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy.
National Science Teachers Association, Washington, D.C.
Spons Agency—Department of Energy, Washington, D.C. Office of Education, Business and Labor Affairs.
Report No.—HCP/U-3841-0004
Pub Date—Jun 79
Contract—EX-76-C-10-3841
ote—114p.
ailable from—U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830 (no price quoted)
Pub Type— Guides - Classroom - Learner (051) — Collected Works - Serials (022)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—*Energy, *Energy Conservation, Environmental Education, *Fuel Consumption, *Fuels, History, *Interdisciplinary Approach, Mathematics Education, *Natural Resources, Science Education, Secondary Education, Social Studies
Identifiers—*Energy Education

This unit is intended to give students an understanding of the influence that various sources of energy have had on culture and on understanding of the effects of energy change. Physical properties of wood, coal, and oil are examined, and the ability of these substances to give heat is considered. Students practice the mathematics necessary to understand energy conversion. (Author/RE)

ED 179 375 **SE 028 823**
Day, John Weeden, Kenneth P
Western Coal, Boom or Bust? Grades 9-11. Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy.
National Science Teachers Association, Washington, D.C.
Spons Agency—Department of Energy, Washington, D.C. Office of Education, Business and Labor Affairs.
Report No.—HCP/U-3841-10
Pub Date—Jun 79
Contract—EX-76-C-10-3841
Note—77p.
Available from—U.S. Department of Energy, Technical Information Center, P.O. Box 62, Oak Ridge, TN 37830 (no price quoted)
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052) — Collected Works - Serials (022)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Energy, Environment, *Environmental Education, Environmental Influences, *Fuels, History, *Interdisciplinary Approach, Land Use, *Natural Resources, Pollution, *Science Education, *Secondary Education, Social Studies
Identifiers—Coal, *Energy Education

This unit uses energy choices to raise questions about the energy option of coal available to the nation along with attendant advantages and disadvantages of this option. The unit introduces locations of coal deposits in the U.S. and their types. Emphasis is on relatively unexploited deposits in the western United States. Comparisons are made between western coal and that of the east. Heat and sulfer content are discussed. Possible boom town effects are discussed in the context of development of resources. Strip mining controversies are examined. (Author/RE)

ED 179 395 **SE 029 327**
Lay, Gary A., Ed. McCurdy, Donald, Ed.
Basic Teaching Units, BTU's on Energy. Nebraska Energy Conservation Plan.
Nebraska State Energy Office, Lincoln.
Pub Date—[78]
Note—598p.; Not available in hard copy due to marginal legibility of original document; Appendix 6, pages VII-53 through VII-58 and XIV-27 removed due to copyright restrictions
Available from—Nebraska State Energy Office, 301 South Centennial Mall, 4th Floor, P.O. Box 95085, Lincoln, NE 68509 (no price quoted)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF03 Plus Postage. PC Not Available from EDRS.
Descriptors—*Curriculum, *Energy, *Energy Conservation, *Fuel Consumption, Fuels, Home Economics, Industrial Arts, *Interdisciplinary Approach, Natural Resources, Petroleum Industry, Physics, Science Education, *Secondary Education, Solar Radiation, Vocational Agriculture
Identifiers—*Energy Education

This collection of 21 teaching units is designed for use in energy education within various disciplines of the secondary curriculum. Each unit is designed to stand alone. Suggested teaching times range from five to fifteen days. No particular order of presentation is implied. Each unit is organized as follows: abstract, recommended level, time required, teaching strategies, advance preparation, goals and objectives, daily lessons recommended, evaluation suggestions, and bibliography. Units that require handouts or transparencies include duplication masters. Teachers are encouraged to modify the units. Topics include scientific principles of energy; historical, present and future energy sources; economics; and solar energy. (RE)

ED 180 791 **SE 029 432**
Posthuma, Fred Stephey, Merle
Introduction to Energy. Instructional Modules and Transparency Masters.
Wisconsin Univ., Madison. Wisconsin Vocational Studies Center.
Pub Date—78
Note—139p.; Not available in hard copy due to copyright restrictions
Available from—Wisconsin Vocational Studies Center, 1025 W. Johnson St., Publications Unit, Room 265, University of Wisconsin, Madison, WI 53706 ($6.50)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Curriculum, *Energy, *Energy Conservation, *Environmental Education, Natural Resources, *Science Education, Secondary Education, Solar Radiation
Identifiers—*Energy Education

This energy module is intended for an introductory course on energy for secondary school classes. It consists of behavioral objectives, general background, vocabulary, lesson outlines, coordinated activities, and an annotated bibliography of resources. It is intended to provide a fundamental guide for the establishment of the teacher's own energy curriculum. Because the module is intended to include a shop or lab component, the first two lessons deal with a preliminary introduction and safety. (Author)

ED 182 135 **SE 029 776**
Higdem, Mary And Others
Idaho Energy Conservation Resource Guide for Science, Grades 7-12.
Idaho State Dept. of Education, Boise.; Idaho State Office of Energy, Boise.
Spons Agency—Department of Energy, Washington, D.C.
Pub Date—Feb 79
Note—31p.; For related documents, see SE 029 772-778. Printed on colored background.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Depleted Resources, *Energy Conservation, Environment, *Environmental Education, Natural Resources, *Resource Guides, *Science Activities, Sciences, *Secondary Education, Social Values, *Teaching Guides

This manual is a resource guide on energy conservation for teachers of science students from grades seven to twelve. It contains 12 student activities which are grouped into four goal oriented units. The main objectives of the project are to increase the student's understanding that: (1) Natural laws limit energy availability; (2) Energy consumption affects both man and his environment; (3) Human values and attitudes affect energy usage; and (4) Energy consumption is necessary to maintain our lifestyle. (SB)

ED 184 817 **SE 030 347**
Bottinelli, Charles A., Ed. Dow, John O., Ed.
Energy and Energy Conservation Activities for High School Students.
Energy Information Associates, Inc., Littleton, Colo.
Spons Agency—National Science Foundation, Washington, D.C.
Report No.—SPI-78-04527
Pub Date—Apr 79
Note—233p.; Contains marginal legibility in Appendices.
Available from—Energy Information Associates, Inc., 2690 W. Main St., Littleton, CO 80120 ($6.00 plus handling and postage).
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC10 Plus Postage.
Descriptors—*Class Activities, Energy, *Energy Conservation, Environment, *Environmental Education, *Interdisciplinary Approach, Mathematics Education, Natural Resources, *Physical Sciences, Science Education, Secondary Education, *Solar Radiation

This manual contains fifteen energy activities suitable for high school physical and environmental science and mathematics classrooms. The activities are independent, each having its own objectives, introduction, and background information. A special section of each activity is written for the instructor and contains limits, sample data, and suggestions for follow-up activities. Most of the activities are analytical or empirical and require students to have completed a second year of high school algebra. (Author/RE)

ED 186 282 **SE 030 761**
Energy Systems - Present, Future: Extra Terrestrials, Grades 7, 8, 9./Science.
National Science Teachers Association, Washington, D.C.
Spons Agency—Department of Energy, Washington, D.C. Office of Consumer Affairs.
Report N0.—DOE/CA/06083-03
Pub Date—Apr 80
Contract—EC-77-C-01-6083
Note—139p.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—*Curriculum Development, *Energy, Energy Conservation, Fuel Consumption, Instructional Materials, Nuclear Physics, *Science Curriculum, *Science Education, Secondary Education, Secondary School Science, Solar Radiation, *Systems Approach, *Technological Advancement
Identifiers—*Energy Education

The 12 lessons presented in this guide are structured so that they may be integrated into science lessons in 7th-, 8th-, or 9th-grades. Suggestions are made for extension of study. Lessons are approached through classroom role-playing of outer space visitors who seek to understand energy conversion principles used on Earth. Major emphasis is placed on energy flow-through systems. Energy alternatives for the future are also examined. (Author/RE)

ED 194 353 **SE 033 197**
LaSalle, Donald P., Ed. And Others
Energywatch: Designing Energy Education Into the Curriculum, Volume 2–Grades 7-12.
Connecticut State Dept. of Education, Hartford.; Talcott Mountain Science Center, Avon, Conn.
Pub Date—Nov 80
Grant—NESEC-EG-77-G-01-4044
Note—289p.; For related document, see SE 033

196. Funding received from the Northeast Solar Energy Center.
Available from—Dr. Sigmund Abeles, Connecticut State Dept. of Education, Box 2219, Hartford, CT 06115 (no price quoted).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC12 Plus Postage.
Descriptors—Conservation Education, *Energy, *Energy Conservation, Environmental Education, *Instructional Materials, Interdisciplinary Approach, Mathematics Education, *Physical Sciences, *Science Education, *Science Instruction, Secondary Education, Secondary School Science, Social Studies, Solar Radiation

Presented in this teacher's manual are more than 40 energy-related discussions and projects for use in conjunction with secondary school courses in mathematics, science, social studies, and language arts. Designed to help students discover ways to study and conserve energy, the activities also stress alternate energy sources and their applications. Lessons are organized under four categories: (1) energy conservation, (2) solar energy concepts, (3) solar energy applications, and (4) alternate energy sources. Typical among these activities are constructing a solar collector, debating offshore drilling proposals, tracking the sun by computer, and investigating the effects of thermal pollution. Included in the lesson plans are teacher background material, suggestions for lesson preparation, lists of related activities, student handouts, and step-by-step procedures for conducting the activities. (WB)

Secondary

Multidisciplinary

ED 022 690 **SE 005 015**
Scott, Arthur And Others
BIOLOGY–CHEMISTRY–PHYSICS, STUDENTS' GUIDE, A THREE-YEAR SEQUENCE, PARTS I AND II.
Reed Coll., Portland, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 67
Note—182p.
EDRS Price MF-$0.75 HC-$7.36
Descriptors—BIOLOGY, CHEMISTRY, *CURRICULUM, *INSTRUCTIONAL MATERIALS, *INTERDISCIPLINARY APPROACH, PROGRAM DESCRIPTIONS, SCIENCE ACTIVITIES, SCIENCE COURSE IMPROVEMENT PROJECT, *SECONDARY SCHOOL SCIENCE
Identifiers—National Science Foundation, Oregon, Portland, Portland Project

Parts I and II of the students' guide to the three-year integrated biology, chemistry, and physics course being prepared by the Portland Project Committee are contained in this guide. A committee reviewed and selected material developed by the national course improvement groups–Physical Science Study Committee, Chemical Bond Approach, Chemical Education Materials Study, Biological Science Curriculum Study and Introductory Physical Science–and added material written especially for the project. This material was fitted into a previously prepared course outline which endeavored to match students' abilities, interests, and maturity level with the level of sophistication of the concepts. This course was to be taught for the first time in eight Oregon schools in the 1967-68 academic year. This guide contains Part I, "Perception and Quantification" and Part II, "Properties of Matter." These themes are developed through student-centered activities. A table relates the student activity to the most pertinent text reference or suitable film. (GR)

ED 022 691 **SE 005 017**
Scott, Arthur And Others
BIOLOGY–CHEMISTRY–PHYSICS, TEACHERS' GUIDE, A THREE-YEAR SEQUENCE, PARTS III AND IV
Portland State Coll., Oreg.; Reed Coll., Portland, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 67
Note—299p.
EDRS Price MF-$1.25 HC-$12.04
Descriptors—BIOLOGY, CHEMISTRY, *CURRICULUM, *INTERDISCIPLINARY APPROACH, PHYSICS, PROGRAM DESCRIPTIONS, *SCIENCE ACTIVITIES, SCIENCE COURSE IMPROVEMENT PROJECT, *SECONDARY SCHOOL SCIENCE, TEACHING GUIDES, TEACHING PROCEDURES

This guide contains Parts III and IV of the teacher's guide to the first year of the three-year integrated biology, chemistry, and physics courses being prepared by the Portland Project Committee. It continues the integration of material from the science course improvement projects with that specially prepared for the course by the committee. Part III is titled "Energy and Work" and Part IV is titled "Ecology." (GR)

ED 025 428 **SE 005 845**
Cubberley/Lockheed Science Project Final Report, Volume I - Narrative Report. A Development Program to Attain Stated Behavioral Objectives in Science: A System Approach.
Cubberley (Elwood P.) Senior High School, Palo Alto, Calif.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Elementary and Secondary Education
Report No—DPSC-67-3011
Note—79p.
EDRS Price MF-$0.50 HC-$4.05
Descriptors—*Biological Sciences, *Curriculum Development, *Earth Science, *Secondary School Science, *Systems Approach
Identifiers—Central Iowa Low-Achiever Mathematics Project

This book represents the final report of the planning phase in the development of an instructional system to be implemented at Cubberley High School in the Palo Alto Unified School District. The purpose of this project is to develop a pilot science learning system in the earth life sciences. The systems analysis approach was utilized in an attempt to avoid the traditional instructional constraints and to bring about improved science instruction. The specific techniques of systems analysis employed in this project include functions analysis, organization of project activities, criteria establishment to test design solutions, and systematic development of systems design solutions. This work was prepared under ESEA Title III contract. (BC)

ED 025 429 **SE 005 846**
Cubberley/Lockheed Science Project Final Report, Volume II - Experimental Instructional Materials. An Instructional Package for a Unit on Scientific Inquiry.
Cubberley (Elwood P.) Senior High School, Palo Alto, Calif.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Elementary and Secondary Education.
Pub Date Feb 68
Note—141p.
EDRS Price MF-$0.75 HC-$7.15
Descriptors—*Biological Sciences, Curriculum Development, *Earth Science, *Instructional Materials, Laboratory Manuals, *Programed Instruction, Science Activities, *Secondary School Science
Identifiers—Central Iowa Low-Achiever Mathematics Project

The purpose of this instructional unit is to convey an understanding of the part played by effective problem definition and hypothesis statement in the solution of scientific problems. The major concepts of the unit are process rather than content oriented. Problems, hypotheses, variables, constants and controls represent the principal concepts emphasized in the unit. The unit is organized into four parts: Recognizing Problems, Stating Problems Effectively, Formulating Hypotheses, and Testing Hypotheses. The teaching materials consist of an informational narrative, a set of illustrative slides, and worksheets for the students. A multiple choice post-test is provided as a means of evaluating student attainment of eight behavioral objectives. This work was prepared under ESEA Title III contract. (BC)

ED 040 086 **SE 008 854**
Van Deventer, William C. Duyser, Lucille
Idea-Centered Laboratory Science (I-CLS), [Unit] C, How a Scientist Expects His World To Behave.
Grand Rapids Public Schools, Mich.; Western Michigan Univ., Kalamazoo.
Pub Date 69
Note—65p
EDRS Price MF-$0.50 HC-$3.35
Descriptors—*Curriculum, *Fused Curriculum, Instruction, *Instructional Materials, Interdisciplinary Approach, *Science Activities, *Secondary School Science, Teaching Guides

The major ideas of this unit are: consistency and uniformity, cause and effect, and parsimony. Laboratory experiences consist of investigations into: projecting expectations, moon and stars, the relationships among different kinds of change (daily, monthly, annual temperature changes), force and motion, chemical reactions, superstitions, origin of the Earth, origin of life, pebbles, cobbles, boulders, and two theories of evolution. The laboratory experiences in this unit, as in all I-CLS units, are inquiry related and designed primarily to develop an understanding of how a scientist expects his world to behave. The format for each laboratory experience is as follows: Introduction, Materials and Equipment, Collecting Data, and Follow-up. (BR)

ED 040 087 **SE 008 855**
Van Deventer, William C. Duyser, Lucille
Idea-Centered Laboratory Science (I-CLS): The Kind of World a Scientist Thinks He Has Found, Unit D, A Scientist Assumes the Existence of Variation and Change.
Grand Rapids Public Schools, Mich.; Western Michigan Univ., Kalamazoo.
Pub Date 69
Note—122p.
EDRS Price MF-$0.50 HC-$6.20
Descriptors—*Curriculum, *Fused Curriculum, Instruction, *Instructional Materials, Interdisciplinary Approach, *Science Activities, *Secondary School Science, Teaching Guides

The major ideas of the unit are: normal curves, gradients, extrapolation and interpolation, directional change, cyclic change, and dynamic equilibrium. Some 28 different inquiry-oriented laboratory experiences are designed to develop understanding of these major ideas. The laboratory experience format is as follows: Introduction, Materials and Equipment, Collecting Data, and Follow-up. These experiences cut across subject matter areas, ranging from biology to chemistry and geology and include such topics as evolution, chemical indicators, and topographical maps. (BR)

ED 040 088 **SE 008 856**
Van Deventer, William C. Duyser, Lucille
Idea-Centered Laboratory Science (I-CLS), The Kind of World a Scientist Thinks He Has Found, Unit E, A Scientist Thinks in Terms of Relationships Rather Than Absolutes.
Grand Rapids Public Schools, Mich.; Western Michigan Univ., Kalamazoo.
Pub Date 69
Note—134p.
EDRS Price MF-$0.75 HC-$6.80
Descriptors—*Curriculum, *Fused Curriculum, Instruction, *Instructional Materials, Interdisciplinary Approach, *Science Activities, *Secondary School Science, Teaching Guides

The major idea of the unit is: a scientist thinks in terms of relationships rather than absolutes. Twenty-nine inquiry oriented laboratory experiences are arranged under the headings: (1) measurements express relationships, (2) patterns govern relationships, (3) frames of reference determine relationships, (4) heredity and environment are necessarily related, (5) rates and changes are necessarily related, and (6) man and his tools are necessarily related. The laboratory experience format throughout is as follows: Introduction, Materials and Equipment, Collecting Data, and Follow-up. Experiences cut across many subject matter areas and include topics such as "development of the chick embryo" and "calories and degrees," but all are designed to develop an understanding of the main idea of the unit. (BR)

ED 040 089 **SE 008 857**
Van Deventer, William C. Duyser, Lucille
[Idea-Centered Laboratory Science (I-CLS).] Sample Tests.
Grand Rapids Public Schools, Mich.; Western Michigan Univ., Kalamazoo.
Pub Date 69
Note—36p
EDRS Price MF-$0.25 HC-$1.90
Descriptors—*Evaluation, *Instructional Materials, Science Activities, *Secondary School Science, *Teacher Developed Materials, *Tests

The tests included in this document are teacher-constructed. They are based on questions asked by students in connection with and following completion of laboratory experiences directed toward the understanding of specific "Ideas". The "Ideas" were taught, the laboratory experiences were completed, the tests were constructed, and the test keys were prepared in accordance with the practices recommended in "Suggested Procedures for Teachers Using the Idea-Centered Laboratory Science Program." The tests described are intended to serve as samples and it is recommended that they should not be used outside the setting for which they were constructed. The samples given in this paper are models which the teacher can follow in constructing his own tests. These tests are designed to measure the quality and extent of students' thinking in relation to specific "Ideas". (BR)

ED 052 607 EM 009 061

BASIC Simulation Programs; Volumes I and II. Biology, Earth Science, Chemistry.

Brooklyn Polytechnic Inst., N.Y.; Digital Equipment Corp., Maynard, Mass.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 31 Jan 71

Note—137p.; Developed by the Huntington Computer Project

Available from—Digital Equipment Corporation, Educational Marketing (5-2), 146 Main Street, Maynard, Massachusetts 01754 ($4.00)

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—*Biology, Chemical Equilibrium, *Chemistry, Climatic Factors, *Computer Assisted Instruction, *Computer Programs, Concept Teaching, *Earth Science, Genetics, Manuals, Natural Sciences, Program Descriptions, Secondary School Science, Teaching Guides

Computer programs which teach concepts and processes related to biology, earth science, and chemistry are presented. The seven biology problems deal with aspects of genetics, evolution and natural selection, gametogenesis, enzymes, photosynthesis, and the transport of material across a membrane. Four earth science problems concern climates, the formation of cumulus clouds, and water budgets. The 12 chemistry problems take up atomic weight, Avogadro's number, radioactive decay, half-life, equilibrium, mass defect, molarity, pH, percent composition, and mass and volume problems. For each lesson the objectives, necessary preliminary preparation, knowledge prerequisites, ways to use the problem, the computer program, and sample printouts are provided. All programs are written in the language BASIC, and the topics are suitable for the high school level. (JK)

ED 052 608 EM 009 062

BASIC Simulation Programs; Volumes III and IV. Mathematics, Physics.

Brooklyn Polytechnic Inst., N.Y.; Digital Equipment Corp., Maynard, Mass.

Spons Agency—National Science Foundation, Washington, D.C.

Pub Date 31 Jan 71

Note—223p.; Developed by the Huntington Computer Project

Available from—Digital Equipment Corporation, Educational Marketing (5-2), 146 Main Street, Maynard, Massachusetts 01754 ($4.00)

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—*Computer Assisted Instruction, *Computer Programs, Manuals, *Mathematics Instruction, *Physics Instruction, Program Descriptions, Secondary School Mathematics, Simulation, *Teaching Guides

The computer programs presented here were developed as a part of the Huntington Computer Project. They were tested on a Digital Equipment Corporation TSS-8 time-shared computer and run in a version of BASIC. Mathematics and physics programs are presented in this volume. The 20 mathematics programs include ones which review multiplication skills; solve financial problems concerning installment buying, long term loans, and savings accounts; find prime factors; find solutions to sets of up to 10 simultaneous equations; simulate the stock market; and find the volume of solids of revolution. The 21 physics programs include a plot routine illustrating the B field about one- and two-wire currents, a display of hydrogen line spectrum and energy level diagrams, a solution to lens problems, a calculation of mass defect, a photoelectric simulation, a plot routine to aid in visualizing Snell's law, a demonstration of the effects of changing velocity on orbital motion, and a plot routine for a graph of a fixed and a variable wave and the superposition of the waves. For each complete program the following information is also included: a description of the program, a statement of objectives, a discussion of presentation methods, and a sample printout. (JY)

ED 053 945 24 SE 012 151

Pfeiffer, Carl H.

The Interaction of Man with His Environment. Science III and IIIB.

Monona Grove High School, Monona, Wis.; Wisconsin State Dept. of Education, Madison.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-0646

Pub Date 68

Note—320p.; Due to copyright restrictions, some pages are not included

EDRS Price MF-$0.65 HC-$13.16

Descriptors—*Ecology, Environment, *Environmental Education, *Fused Curriculum, *Instructional Materials, *Integrated Curriculum, Interdisciplinary Approach, Science Activities, Secondary School Science, Workbooks

The two student notebooks in this set provide the basic course outline and assignments for the third year of a four year senior high school unified science program. This course is the less technical of the two third-year courses offered in the program. The first of the three major units in this course, Structure and Dynamics of the Biosphere, is composed of three sub-units: the nature and scope of ecological science, the ecosystem, and man in the biosphere. The second unit, Population Structure and Dynamics, contains four sub-units: structure and organization, the functioning of populations, population genetics, and human populations. The third unit, Problems of Coexistence, contains these sub-units: problems of coexistence with the physical environment, with other organisms, and within society. The final sub-unit of the course is Science and the Evolving Society. The notebook materials for each of the sub-units include: a list of required and recommended readings from various other books; questions for consideration in introducing a lesson; a brief background reading; a basic outline of the lectures with space provided within the outline for notes; laboratory activities and investigations; laboratory problem reports and other kinds of assignments (discussion questions, fill-ins, problems); and summary statements and review questions. Numerous diagrams and illustrations are included. (PR)

ED 065 289 SE 013 847

[Australian Science Education Project Working Papers].

Australian Science Education Project, Toorak, Victoria.

Pub Date [72]

Note—103p.

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—Cognitive Development, *Curriculum Development, Educational Psychology, Guidelines, Instruction, *Objectives, *Science Course Improvement Project, *Science Education, Secondary School Science

Identifiers—*Australian Science Education Project

A number of the working papers produced for the guidance of the staff of the Australian Science Education Project during the development of instructional units for secondary school science are included in this package. Topics covered range from a discussion of the implications, for curriculum writers, of the research on cognitive development to checklists for stages in the development of a unit. The titles of the working papers are: "Ways of Dealing With Subject Matter According to the Stages of Development of the Children," "The Structure of a Typical Unit," "Contents of Teacher's Guides (First Trials)," "Units to be Developed," "Steps in the Development of a Unit," "Preamble to the Aims," "The Aims of the Australian Science Education Project," "The Main Ideas to be Developed in ASEP Materials," "Use of the Inquiry Approach," "A Taxonomy of ASEP Objectives," "Preparation of Second Specifications of a Unit," "Re-allocation of Units for Development," "A Plan for the Second Trials of Units," and "Checklist for Unit Development and Production." [Not available in hard copy due to marginal legibility of original document.] (AL)

ED 066 507 TM 001 991

Lieberman, Marcus And Others

Junior High Science: Behavioral Objectives and Test Items.

Institute for Educational Research, Downers Grove, Ill.

Pub Date [72]

Note—160p.

Available from—Institute for Educational Research, 1400 West Maple Avenue, Downers Grove, Illinois 60515 ($6.00)

EDRS Price MF-$0.65 HC-$6.58

Descriptors—*Behavioral Objectives, Curriculum Development, *Individualized Instruction, *Item Banks, *Junior High Schools, Program Evaluation, *Sciences

Identifiers—ESEA Title III, *Evaluation for Individualized Instruction Project

The Objective-Item Bank presented covers 16 sections of four subject areas in each of four grade levels. The four areas are: Language Arts, Math, Social Studies, and Science. The four grade levels are: Primary, Intermediate, Junior High, and High School. The Objective-Item Bank provides school administrators with an initial starting point for curriculum development and with the instrumentation for program evaluation, and offers a mechanism to assist teachers in stating more specifically the goals of their instructional program. In addition, it provides the means to determine the extent to which the objectives are accomplished. This document presents the Objective Item Bank for junior high science. (CK)

ED 068 277 SE 014 493

Learning Activities Packages, Earth Science and Life Science.

Miller Junior High School, Marshalltown, Iowa.

Pub Date 72

Note—239p.

Available from—Miller Junior High School, South Eleventh Street, Marshalltown, Iowa 50158 ($10.00 for both sets, $5.00 per set, or $1.00 each activity package)

EDRS Price MF-$0.65 HC-$9.87

Descriptors—*Biology, *Curriculum, *Earth Science, *Junior High Schools, Science Activities, *Teaching Procedures

Thirteen "Learning Activities Packages" for junior high school students focus on earth science and life science. Individual packages can be used with some lecture and films. Each learning activity package lists behavioral objectives and concepts to be used. Lists of reading assignments and references, along with laboratory activities, are also included, followed by a list of resource materials (films, tapes, film strips and enrichment materials), a vocabulary list, grade specifications in terms of required and supplemental activities, and test items. The activity packages are prepared by Miller Junior High School, Marshalltown, Iowa. (Page 128 may be illegible.) (Author/PS)

ED 072 042 SP 007 394

Junior High School Science: A Manual for Teachers. A Search for Structure. Grade 7.

Baltimore County Public Schools, Towson, Md.

Pub Date 69

Note—496p.

Available from—Board of Education of Baltimore County, Towson, Md. 21204 ($15.00) Per Copy

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—*Curriculum Design, *Curriculum Guides, Grade 7, *Junior High Schools, *Science Curriculum, *Science Teachers

GRADES OR AGES Grade 7 SUBJECT MATTER Science ORGANIZATION AND PHYSICAL APPEARANCE The introduction describes the development of the junior high school science program. The main text is divided into three phases: Processes and Skills, Developing a Model of Matter, and Human Structure and Function. Phase I contains two subcategories:

Rocks and Minerals, and Insects. The manual is lithographed and spiral bound with a hard cover. OBJECTIVES AND ACTIVITIES: Objectives are given before each section and activities are found under Teaching Suggestions. INSTRUCTIONAL MATERIALS: The text contains references for the teacher in each section. Four student manuals on rocks and minerals, insects, a model of matter, and living systems are included. STUDENT ASSESSMENT: Sample assessment tasks are included in the Teaching Suggestions. (BRB)

ED 077 737 SE 016 297
Rogers, Arnold R., Ed. And Others
Secondary Schools Curriculum Guide, Science, Grades 7-9, Levels 1-16.
Cranston School Dept., R.I.
Spons Agency—Office of Education (DHEW), Washington, D.C. Projects to Advance Creativity in Education.
Pub Date Jun 72
Note—68p.; Draft Copy
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Curriculum, *Curriculum Guides, Instruction, Instructional Materials, *Resource Materials, Science Activities, *Secondary School Science, Teaching Methods
Identifiers—Blooms Taxonomy, ESEA Title III

This curriculum guide provides instructional objectives and activities for teaching science in grades 7-9. The objectives are stated in behavioral or performance terms and have been arranged in increasing levels of complexity according to Bloom's Taxonomy. The behavioral objectives generally include two major components: (1) the objective statement which specifies the intended behavior of the students as a result of having participated in a set of instructional experiences, and (2) activities which outline what the student should do to attain the objective. It is stressed that the suggested objectives and activities should not be seen as limiting teacher innovation or what the student is expected to know, rather, they should be added to, deleted, or modified by the teacher according to he needs and characteristics of individual students and the teacher's own experience and knowledge. This work was prepared under an ESEA Title III contract. (Author/JR)

ED 077 738 SE 016 298
Rogers, Arnold R., Ed. And Others
Secondary Schools Curriculum Guide, Science, Grades 10-12, Levels 17-33.
Cranston School Dept., R.I.
Spons Agency—Office of Education (DHEW), Washington, D.C. Projects to Advance Creativity in Education.
Pub Date 72
Note—84p.; Draft Copy
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, *Curriculum, *Curriculum Guides, Instruction, Instructional Materials, *Resource Materials, Science Activities, *Secondary School Science, Teaching Methods
Identifiers—Blooms Taxonomy, ESEA Title III

This curriculum guide provides instructional objectives and activities for teaching science in grades 10-12. The objectives are stated in behavioral or performance terms and have been arranged in increasing levels of complexity according to Bloom's Taxonomy. The behavioral objectives generally include two major components: (1) the objective statement which specifies the intended behavior of the students as a result of having participated in a set of instructional experiences, and (2) activities which outline what the student should do to attain the objectives. It is stressed that the suggested objectives and activities should not be seen as limiting teacher innovation or what the student is expected to know, rather, they should be added to, deleted, or modified by the teacher according to the needs and characteristics of individual students and the teacher's own experience and knowledge. This work was prepared under an ESEA Title III contract. (Author/JR)

ED 086 230 IR 000 083
Spencer, Donald D.
A Guide to Teaching About Computers In Secondary Schools.
Pub Date 73
Note—138p.
Available from—Abacus Computer Corporation, Suite 222, 110 E. Granada Avenue, Ormond Beach, Florida 32074 ($12.95)
Document Not Available from EDRS.
Descriptors—Computer Assisted Instruction, Computer Oriented Programs, *Computers, Computer Science, Computer Science Education, Inservice Teacher Education, Junior High Schools, Mathematics Education, *Methods Courses, Preservice Education, Problem Solving, Science Education, *Secondary Grades, Secondary School Mathematics, Secondary School Science, Secondary School Teachers, *Teacher Education, *Teaching Guides

Teachers and teacher-trainees are provided with comprehensive information about how to use computers in secondary school education. The book covers planning, content and methodology and can be used as a text for methods courses in computer science or as an in-depth supplement to texts in mathematics methods. Part I deals with computer science in the secondary school curriculum and describes how computers are used as problem-solving tools in algebra, geometry, chemistry, trigonometry, physics and junior high mathematics. Part II constitutes the heart of the book, treating methods of teaching computer science. The third and final section discusses school administrative uses of the computer, including class scheduling, automatic test scoring, attendance accounting and other similar tasks. (Author/PB)

ED 089 740 IR 000 452
Visich, Marian, Jr. Braun, Ludwig
The Use of Computer Simulations in High School Curricula.
State Univ. of New York, Stony Brook. Huntington Computer Project.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date Jan 74
Note—36p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Biology, *Computer Assisted Instruction, *Digital Computers, *Educational Games, *High School Curriculum, High School Students, Instructional Materials, Physics, Program Descriptions, Secondary Grades, *Simulation, Social Studies
Identifiers—Digital Equipment Corporation, *Huntington Computer Project

The Huntington Computer Project has developed 17 simulation games which can be used for instructional purposes in high schools. These games were designed to run on digital computers and to deal with material from either biology, physics, or social studies. Distribution was achieved through the Digital Equipment Corporation, which disseminated teacher manuals, resource manuals, and student manuals to over 600 teachers and 25,000 students in 400 secondary schools during the 1972-73 school year; these target populations were expected to quadruple in the following year. Evaluation of the use of the computerized simulation games led to the conclusion that they made a significant contribution to learning. This was particularly true in situations in which students were denied direct experience with the phenomena being studied due to such problems as the students' inexperience with experimental techniques, the lack of laboratory equipment or time, difficulty or danger in obtaining adequate samples, and the impossibility of controlling extraneous variables in real life. Descriptions of six of the simulation games are appended to the report. (PB)

ED 089 981 SE 017 479
Robinson, James T.
A Theoretical Framework for Multidisciplinary Science Curricula for Early Adolescents: The BSCS Human Sciences Program.
Pub Date 16 Apr 74
Note—22p.; Paper presented at the annual meeting of the American Educational Research Association (Chicago, Illinois, April 1974)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Adolescents, *Curriculum Development, Integrated Curriculum, Junior High School Students, Middle Schools, *Science Course Improvement Project, Science Education, Secondary School Science
Identifiers—*BSCS Human Sciences Program, Multidisciplinary Science Curriculum

The theoretical framework for a multidisciplinary science curriculum for early adolescents is described. Enhancing physical, cognitive, moral, social, and personal development of early adolescents is proposed instead of cultural transmission as the chief goal of education. Major elements of the framework include interface themes and subsumed concepts from biological, social, and behavioral sciences; generic questions that represent major concerns and interests of early adolescents; and problems that are proposed as curriculum components. An experimental three-year curriculum for eleven- to thirteen-year-olds is being developed and tested as an exemplar of the proposed theoretical framework. (Author)

ED 091 175 SE 017 514
Science: Grade 7. Curriculum Bulletin, 1971-72 Series, No. 2.
New York City Board of Education, Brooklyn, N.Y. Bureau of Curriculum Development.
Pub Date 71
Note—330p.
Available from—New York Board of Education, Publications Sales Office, 110 Livingston Street, Brooklyn, New York 11201 ($5.00)
EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—Biology, *Curriculum Guides, Earth Science, General Science, Grade 7, Physical Sciences, *Science Activities, Science Education, *Secondary School Science, *Teaching Guides
Identifiers—New York City

This book is a curriculum guide for seventh-grade general science. It contains four units of chemistry, physics, biology, and earth science. Each unit is divided into sections covering major concepts. Each section contains science activities and contains explanations of objectives and implementation of the lesson. At the end of each section are review exercises, research topics, and resource materials. Also following each unit is a suggested unit examination. (MR)

ED 093 576 SE 016 485
Life Science, Grade 7. Curricular Guide.
York County School District 3, Rock Hill, S.C.
Pub Date [74]
Note—50p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Biology, Curriculum Design, *Curriculum Guides, *Human Development, *Junior High School Students, Science Education, Secondary School Science
Identifiers—South Carolina

This curricular guide focuses on life science and is designed for use with seventh grade students. Life science was chosen as the course of study based on the rationale that, as pupils enter junior high school, they are in early adolescence and find it difficult to understand themselves so that the study of living things with a thorough explanation of the functions of the human body and its behavior seems appropriate. The guide contains objectives (not stated in behavioral form), a content outline, types of suggested activities, materials required, points to consider when evaluating the attainment of the objectives, a 362-word vocabulary list (arranged in alphabetical order), a bibliography for students and for teachers, and a list of filmstrips available in the professional library of the school district (Rock Hill, South Carolina) for which this guide was developed. (PEB)

ED 093 700 SE 018 069
Science 9. DeSoto Parish Curriculum Guide.
DeSoto Parish School Board, Mansfield, La.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Aug 71
Note—208p.
EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE
Descriptors—*Curriculum Guides, Earth Science, General Science, *Grade 9, Instruction, Mechanics (Physics), Meteorology, Natural

Sciences, Science Curriculum, *Science Units, Scientific Concepts, *Secondary School Science, Teaching Guides, *Teaching Techniques
Identifiers—Elementary Secondary Education Act Title I, ESEA Title I

This guide is designed to aid the teacher in planning and teaching a ninth-grade science course. It should provide students with a functional system of knowledge which is applicable to new situations and will serve as the basis for future decisions. Five units outlined are entitled: Introduction to Service; The Earth's Storehouse; The Earth's Weather; Work (Easing Work); and Speeding Communication. Each unit is subdivided into a series of Main Ideas which were further subdivided into Concepts. When integrated, these concepts should explain the main idea. The functional level, however, is viewed as the Subconcept. Accompanying each set of subconcepts are suggested materials and methods, behavioral objectives, and suggested evaluation techniques. (JP)

ED 096 128 SE 018 029
Sisk, Diane
Mass - Metric Weight.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—15p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Behavioral Objectives, *General Science, Instruction, *Instructional Materials, *Measurement, Metric System, *Middle Schools, Science Education, Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program, developed for high, medium and low level achievers, is directed toward a course in general science in middle schools. Mathematics of fractions and decimals is described as a prerequisite to the use of the packet. Two behavioral objectives are listed. Both involve the students' determining mass, first to the nearest tenth of a gram and a second, to the nearest one-tenth of a gram, using liquids and gases. The equipment needed is listed. A student guide, a vocabulary list and a copy of an evaluation exercise, with instructions and answers, are prepared for the teacher. (EB)

ED 096 129 SE 018 030
Sisk, Diane
Liter - Metric Volume.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Behavioral Objectives, *General Science, Instruction, *Instructional Materials, *Measurement, Metric System, *Middle Schools, Science Education, Secondary School Science, Teacher Developed Materials, Units O F Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional program, developed as part of a general science course, is offered for students in the middle schools. Mathematics of fractions and decimals is considered to be prerequisite knowledge. The behavioral objectives are directed toward mastery of determining volumes of solid objects using the water displacement method as well as by using measurements made with a metric ruler. The equipment needed is listed. Time allotment is 12 minutes. A bibliography is included with the student script. (EB)

ED 096 152 SE 018 054
Stowell, E. D., Jr.
Introduction to Vectors, Part 1.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—17p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *General Science, Measurement, *Middle Schools, *Physics, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System, Vectors

This instructional lesson deals with the subject of magnitude and directional quantities. It is studied in physics and general science classes in middle or high schools. A previous knowledge of geometry is required for the students who would be using this learning activity. Behavioral objectives are suggested. Thirty minutes is considered adequate for the exercise. The script, work sheet, and a list of the necessary equipment are included in the instructional packet. (EB)

ED 098 098 SO 007 868
Teaching Resource Recovery in Science. Resource Recovery Education Program.
National Association of Secondary School Principals, Washington, D.C.; National Center for Resource Recovery, Inc., Washington, D.C.
Pub Date 74
Note—19p.; Related documents are SO 007 866, 867, and 870
Available from—National Association of Secondary School Principals, 1904 Association Drive, Reston, Virginia 22091 ($12.00 for kit, 20 percent discount on order of five or more)
EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—Class Activities, Community Study, *Conservation (Environment), Course Objectives, *Ecology, *Environmental Education, Interdisciplinary Approach, Pollution, Questioning Techniques, Resource Materials, *Science Education, Secondary Education, Teaching Methods, Technology, *Waste Disposal

This guide, one component of the Resource Recovery Education Kit (see SO 007 866 for a description), contains ideas and activities for teaching about solid waste disposal in secondary level science classes. Among the course objectives are the following: (1) to understand that sufficient technology exists to recover a greater segment of the resources than we are now extracting; (2) to learn about improved methods for reducing waste volume and disposing of the residue; and (3) to develop an understanding of how we can conserve depletable resources for the future. Teaching strategies include constructing models, conducting laboratory experiments, research, and classroom discussion. The guide consists of three major study units: (1) Solid Waste: A Growing Problem; (2) Disposal; and (3) Resource Recovery. Objectives, student activities, questions for discussion and research, basic understandings to be developed, and instructional resources are provided for each unit. A special projects section provides visual and print instruction for constructing a model landfill site simulating the waste conditions that lead to water pollution, identifying the microorganisms responsible for the process of composting, and recycling glass. (Author/RM)

ED 099 188 95 SE 017 050
Tanner, R. Thomas
Environmental Studies in the Physical Sciences. Project Reports, Volume 3, The Rachel Carson Project.
Corvallis School District 509J, Oreg.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Bureau No—BR-1-0839
Pub Date Sep 72
Grant—OEG-0-71-4623
Note—77p.; Related documents are SE 017 047-054
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Conservation Education, Curriculum Guides, Energy, *Environmental Education, *Instructional Materials, *Interdisciplinary Approach, Learning Activities, Natural Resources, Physical Sciences, *Program Content, Program Descriptions, Secondary Education, Teaching Guides
Identifiers—*Rachel Carson Project

This document is the third of seven accompanying volumes included in the Rachel Carson Project. The project attempts to introduce environmental education lessons and units into existing courses of study within a high school rather than to implement environmental education through the introduction of new courses. This volume reports the environmentally-related activities implemented in a physics and a chemistry program by two of the teachers involved in the project. The physics unit concentrates on a study of energy beginning with an introduction of the various forms of energy, i.e., kinetic, potential, work, and heat. Next is an examination of the first law of thermodynamics and its application to steam engines and power sources. The unit concludes with an inquiry into the environmental impact of energy use. A bibliography of the texts and materials used is included. The chemistry unit consists of environmental projects in three areas: literature research, model building, and field research. It includes examples of book reports, an example of a student investigation of the water quality of streams in the area, and a student project involving the construction of an electrostatic precipitator. (MLB)

ED 099 189 95 SE 017 051
Tanner, R. Thomas
Environmental Studies in Several Science Courses. Project Reports, Volume 4, The Rachel Carson Project.
Corvallis School District 509J, Oreg.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Bureau No—BR-1-0839
Pub Date Sep 72
Grant—OEG-0-71-4623
Note—84p.; Related documents are SE 017 047-054
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Conservation Education, Curriculum Guides, Ecology, *Environmental Education, *Instructional Materials, *Interdisciplinary Approach, Learning Activities, Natural Resources, *Natural Sciences, *Program Content, Secondary School Science, Teaching Guides
Identifiers—*Rachel Carson Project

This document is the fourth of seven accompanying volumes included in the Rachel Carson Project. The project attempts to introduce environmental education lessons and units into existing courses of study within a high school curriculum rather than to implement environmental education through the introduction of new courses. This volume reports the environmental education activities implemented in the following four special science courses: human ecology, science and society, marine biology, and natural history of Oregon. Course descriptions and objectives, possible topics for research, suggested lecture topics, field trips, annotated film lists, examples of student projects, tests, examples of student handouts, and bibliographies are among the instructional materials included in the report. (MLB)

ED 100 709 SE 018 651
Secondary Schools Curriculum Guide, Science, Grades 7-9. Revised.
Cranston School Dept., R.I.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Rhode Island State Dept. of Education, Providence.
Pub Date 74
Note—67p.; This is a revision to ED 077 737
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Behavioral Objectives, *Curriculum, *Curriculum Guides, Instruction, Instructional Materials, Resource Materials, *Science Activities, *Secondary School Science, Teaching Methods
Identifiers—Blooms Taxonomy, Elementary Secondary Education Act Title III, ESEA Title III

This curriculum guide provides instructional objectives and activities for teaching science in grades 7-9. It is intended to serve as a resource to teachers, students, department chairmen, curriculum planners, and anyone else involved in curriculum planning. At least one major objective is stated for each section. Numbered objectives are specific and intended to indicate the level of learning, the content, and the means of evaluation. Most objectives are followed by activities. The objectives are stated in behavioral or performance terms and have been arranged in increasing levels of complexity according to Bloom's Taxonomy. It is stressed that the suggested objectives and activities should not be seen as limiting teacher innovation or what the student is expected to know, rather, they should be adapted by the teacher according to the needs and characteristics of individual students and the teacher's own experience and knowledge. (Author/EB)

ED 100 710 SE 018 652
Secondary Schools Curriculum Guide, Science, Grades 10-12. Revised.
Cranston School Dept., R.I.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Rhode Island State Dept. of Education, Providence.
Pub Date 74
Note—87p.; This is a revision to ED 077 738
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—*Behavioral Objectives, *Curriculum, *Curriculum Guides, Instruction, Instructional Materials, Resource Materials, *Science Activities, Science Education, *Secondary School Science, Teaching Methods
Identifiers—Blooms Taxonomy, Elementary Secondary Education Act Title III, ESEA Title III

This curriculum guide offers instructional objectives and activities for teaching science in grades 10-12. The objectives are stated in behavioral or performance terms and have been arranged in increasing levels of complexity according to Bloom's Taxonomy. The behavioral objectives generally include: (1) the objective statement, specifying the intended behavior as a result of having participated in a set of instructional experiences; and (2) activities which outline what the student should do to attain the objectives. It is stressed that the guide should not be seen as a limiting factor to teacher innovation or a student's self-expectations; rather, it should be adapted by the teacher according to the needs and characteristics of individual students and the teacher's own experience and knowledge. (Author/EB)

ED 106 105 SE 018 837
Ring, Donald G.
Science Curriculum Format.
Mount Prospect Township High School District 214, Ill.
Pub Date Jan 75
Note—166p.; Not available in hard copy due to quality of print on colored pages
Available from—ERIC/SMEAC, The Ohio State University, 400 Lincoln Tower, Columbus, Ohio 43210 (on loan)
EDRS Price MF-$0.76 HC Not Available from EDRS. PLUS POSTAGE
Descriptors—*Conceptual Schemes, Curriculum Enrichment, *Curriculum Guides, *Interdisciplinary Approach, Models, *Science Curriculum, Science Education, Secondary Education, *Secondary School Science

This document presents a curriculum base for a particular school system comprised of eight high schools. Its purpose is to provide a conceptual base which encourages flexibility and diversity. The format is based on the conceptual schemes identified in the NSTA publication, Theory Into Action. Included in the publication is the philosophy of the science curriculum for this school district as well as a detailed description of the minimum required experiences in science to be fulfilled by students wishing to graduate from schools within the prescribed district. Conceptual schemes are presented in the content of biological sciences, physical science, earth and space science, chemistry, and physics. (Author/EB)

ED 113 176 SE 019 687
The ASEP Bibliography.
Australian Science Education Project, Toorak, Victoria.
Pub Date 75
Note—62p.
Available from—Curriculum Development Centre, 450 St. Kilda Road, Melbourne, Victoria 3004, AUSTRALIA
EDRS Price MF-$0.76 Plus Postage. HC Not Available from EDRS.
Descriptors—*Bibliographies, Curriculum, Information Sources, Instructional Materials, *Library Material Selection, Science Course Improvement Project, Science Education, *Science Materials, Secondary Education, *Secondary School Science
Identifiers—*Australian Science Education Project (ASEP)

This bibliography includes science materials which related to curricula produced by the Australian Science Education Project (ASEP). ASEP has developed 41 separate science units for junior secondary students, 6 service booklets, and a comprehensive handbook for teachers called "A Guide to ASEP." The purpose of the bibliography is twofold: to help libraries determine reference needs resulting from the introduction of ASEP materials into schools, and to provide teachers who are using ASEP materials with a comprehensive reference list so that they can identify their own library needs. It is also hoped that such a bibliography will be useful to other teachers who are developing their own junior science materials. The entries in the bibliography are organized according to the subject content of the 41 ASEP science units and include science books, sourcebooks, journal articles, and non-ASEP curriculum materials. (Author/MLH)

ED 116 995 95 SO 008 824
Allery, Alan J.
Science: An Indian Perspective. Ten Modules for Learning. Indian Ethnic Heritage Studies Curriculum Development Project, 1974-75.
South Dakota State Div. of Elementary and Secondary Education, Pierre.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 75
Note—64p.; For related documents, see SO 008 825-826 and 829; Indian designs may reproduce poorly
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*American Indian Culture, *American Indians, Class Activities, Classification, Elementary Education, Ethnic Studies, Guides, Interdisciplinary Approach, Measurement Techniques, Middle Schools, *Process Education, Science Activities, *Science Units, Skills, Social Studies, *Social Studies Units

In this unit, ten modules provide an open approach to science, offering a wide variety of activities and experiences that include aspects of Indian studies incorporated into the regular science curricula. The materials are intended for use in middle grades as part of a social studies program. The objectives of the unit are to develop students' powers of observation, discrimination, and description of organisms in the classroom and outdoors. The following are titles of some of the modules with the skills each entails in parenthesis: Some Scientific Indian Contributions and an Introduction to the Indian's Close Identification with Nature (classifying); Months, Seasons, Indian Signs, and their Meanings (measuring, estimation, observation); Kitchen Chemistry: Making Fried Bread (measurement); Tangrams and Indian Designs (shape); Indian Beginnings, Origins, Cycles (beginnings, origins, cycles); Things in Nature (observation, recording), and Indian Animals and Birds (population, interaction). Each module is an entity in itself and can be selected for teaching individually or in a series. (Author/ND)

ED 118 430 SE 020 279
Kowalski, Stephen W
Consumer Education in the Science Curriculum.
New Jersey State Dept. of Education, Trenton Center for Consumer Education Services
Report No—Monograph-4
Pub Date 72
Note—30p.
EDRS Price MF-$0.83 HC-$2.06 Plus Postage
Descriptors—*Consumer Education, Course Descriptions, *Curriculum Development, Instructional Materials, *Laboratory Experiments, *Science Activities, Science Education, Secondary Education, Secondary School Science, *Teaching Guides

In this monograph, the implementation of consumer education topics into the science curriculum of secondary schools is advocated. Not only is the need for such activities explained, but several suggested instructional topics are provided. One area of recommended study is that of product comparison. A model outline of operation is provided, along with an example involving comparisons of shampoos. (CP)

ED 129 610 SE 021 415
Mayer, John McCollum, Bettie Lou
Concepts and Applications of Science I, 122933 Science.
Dade County Board of Public Instruction, Miami, Fla.
Pub Date 76
Note—17p.; For related document, see SE021416
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Biological Sciences, *Course Descriptions, *General Science, Natural Sciences, Physical Sciences, *Science Courses, Science Curriculum, *Science Education, Secondary Education, *Secondary School Science

This document outlines the first part of a two-part senior high school general science course designed to familiarize students with elementary chemistry, basic fundamentals and principles of matter and energy, earth structure and movement, introductory astronomy, and interpretation of data. Included are listings of adopted texts, performance objectives, course outline, laboratory investigations, reports and projects, discussion questions, films, references, and a master reference sheet. (SL)

ED 129 611 SE 021 416
Mayer, John McCollum, Bettie Lou
Concepts and Applications of Science II, 122934 Science.
Dade County Board of Public Instruction, Miami, Fla.
Pub Date 76
Note—20p.; For related document, see SE021415
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Biological Sciences, *Course Descriptions, *General Science, Natural Sciences, Physical Sciences, *Science Courses, Science Curriculum, *Science Education, Secondary Education, *Secondary School Science

This document outlines the second part of a two-part senior high school general science course designed to familiarize students with genetics, ecology, biological science, physical science, and atmospheric conditions. Included are listings of adopted texts, performance objectives, course outline, laboratory investigations, reports and projects, discussion questions, films, references, and a master reference sheet. (SL)

ED 133 198 SE 021 774
Gammon, Richard H
Chemistry Between The Stars.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-127
Pub Date Sep 76
Note—66p.; For related documents, see SE 021 773-776; Photographs may not reproduce well
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00655-1, $1.60)
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Astronomy, Chemical Analysis, *Chemistry, Curriculum, *Instructional Materials, Science Education, Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics are covered: the physical conditions in interstellar space in comparison with those of the earth, particularly in regard to gas density, temperature, and radiation; the concept of quantized molecular motion (electronic, vibrational, rotational), and the corresponding energy ranges of radiation; spectroscopic methods for identifying molecules in space; the organic nature of interstellar chemistry, and application of our knowledge of interstellar molecules to study the birth of stars, the structure and movement of our galaxy, the history of interstellar matter, and the origin of the universe and life. Each section is followed by questions and answers, and an appendix contains suggested student projects. Also included are a glossary of terms and suggested reference materials. (MH)

ED 133 199 **SE 021 775**
Jacobs, Kenneth Charles
Extragalactic Astronomy: The Universe Beyond Our Galaxy.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-129
Pub Date Sep 76
Note—44p.; For related documents, see SE 021 773-776
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00657-8, $1.30)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Astronomy, Curriculum, *Instructional Materials, Science Education, *Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The material is presented in three parts: one section provides the fundamental content of extragalactic astronomy, another section discusses modern discoveries in detail, and the last section summarizes the earlier discussions within the structure of the Big Bang Theory of Evolution. Each of the three sections is followed by student exercises and activities, laboratory projects, and questions and answers. The glossary contains unfamiliar terms used in the text and a collection of teacher aids such as literature references and audiovisual materials. (MH)

ED 133 200 **SE 021 776**
Straka, W. C.
The Supernova - A Stellar Spectacle.
American Astronomical Society, Princeton, N.J.
Spons Agency—National Aeronautics and Space Administration, Washington, D.C.; National Science Foundation, Washington, D.C.
Report No—NASA-EP-126
Pub Date Sep 76
Note—50p.; For related documents, see SE 021 773-775; Photographs may not reproduce well
Available from—Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock Number 033-000-00654-3, $1.30)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Astronomy, Curriculum, *Instructional Materials, Science Education, *Scientific Research, Secondary Education, *Secondary School Science, *Space Sciences
Identifiers—NASA, National Aeronautics and Space Administration, *Supernovae

This booklet is part of an American Astronomical Society curriculum project designed to provide teaching materials to teachers of secondary school chemistry, physics, and earth science. The following topics concerning supernovae are included: the outburst as observed and according to theory, the stellar remnant, the nebular remnant, and a summary of some of the unsolved puzzles. Suggested student projects are given, with several levels of difficulty, so that the teacher may choose material appropriate for the particular class. (MH)

ED 134 422 **SE 021 559**
Heat, Energy, and Order, Part Two of an Integrated Science Sequence, Teacher's Guide, 1970 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 70
Note—173p.; For Student Guide, see ED 064 094; For related Teacher's Guides, see SE 021 558-563; Not available in hard copy due to marginal legibility of original document
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Energy, *Integrated Curriculum, Physical Sciences, *Science Activities, Science Course Improvement Project, Science Education, Science Units, Secondary Education, *Secondary School Science, *Unified Studies Programs, Units of Study (Subject Fields)
Identifiers—*Portland Project

This teacher's guide contains part two of the four-part first year Portland Project, a three-year secondary integrated science curriculum sequence. This part involves the student with unifying principles essential for deeper understanding of the concept of energy. Confidence in the atomic nature of matter is built by relating heat in terms of random molecular motion via the colorimetry experiment. The energy concept is then extended and generalized via various energy conversions, and finally, limitations and implications of energy conversion are explored, ending with a view of life as an organizer in nature, powered by energy, but always at the expense of influencing its environment. Notes to the teacher, examples of data, materials and equipment needed, and problem calculations are included. (SL)

ED 134 423 **SE 021 560**
Mice and Men Environmental Balance, Parts Three and Four of an Integrated Science Sequence, Teacher's Guide, 1970 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 70
Note—278p.; For Student Guide, see ED 076 328; For related Teacher's Guides, see SE 021 558-563; Contains occasional light and broken type
EDRS Price MF-$0.83 HC-$15.39 Plus Postage.
Descriptors—*Biological Sciences, Genetics, *Integrated Curriculum, Reproduction (Biology), *Science Activities, Science Course Improvement Project, Science Education, Science Units, Secondary Education, *Secondary School Science, *Unified Studies Programs, Units of Study (Subject Fields)
Identifiers—*Portland Project

This teacher's guide contains parts three and four of the four-part first year Portland Project, a three-year secondary integrated science curriculum sequence. Part three of the guide deals with topics such as the cell, reproduction, embryology, genetics, genetic diseases, genetics and change, populations, effects of density on populations, ecosystems, and communities. Part four deals with related topics. After studying about ecosystems in general terms, the emphasis is shifted to studying about the harmful effects of human activities in upsetting the balance of ecosystems. Topics include water pollution, air quality, and effects of air pollution. In both parts, laboratory exercises are suggested and lengthy lists of supplementary materials are included. Notes for the teacher, examples of data, and problem calculations are included. (SL)

ED 134 424 **SE 021 561**
Motion and Energy Chemical Reactions, Parts One and Two of an Integrated Science Sequence, Teacher's Guide, 1973 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 73
Note—220p.; For 1971 Edition Student Guide, see ED 064 095; For related Teacher's Guides, see SE 021 558-563
EDRS Price MF-$0.83 HC-$11.37 Plus Postage.
Descriptors—Energy, *Integrated Curriculum, Kinetic Molecular Theory, Motion, Physical Sciences, *Science Activities, Science Course Improvement Project, Science Education, Science Units, Secondary Education, *Secondary School Science, *Unified Studies Programs, Units of Study (Subject Fields)
Identifiers—*Portland Project

This teacher's guide is for the second year of the Portland Project, a three-year integrated secondary science curriculum sequence. The first of two parts in this volume, "Motion and Energy," begins with the study of motion, going from the quantitative description to a consideration of what causes motion and a discussion of Newton's laws. There follows the development of the laws of conservation of momentum and energy, including a discussion of energy in biological systems, and culminating with a discussion of the kinetic molecular theory. Part two, "Chemical Reactions," builds basic chemical concepts necessary for the analytical approach in the third year course. Topics considered in this part include the mole concept, equation writing, energetics associated with chemical reactions, the dynamic nature of particles and their interactions, and the application of energy and equilibrium to chemical systems. The Harvard Physics Project textbook and the Chemical Educational Materials Study (CHEMS) textbook are used for most of the reading assignments in the second year course. A review of the development of the three-year program, its rationale and content, and a three-year course subject outline are included in this volume. Notes to the teacher, examples of data, and problem calculations are included. (Author/SL)

ED 134 425 **SE 021 562**
Waves and Particles, The Orbital Atom, Parts One and Two of an Integrated Science Sequence, Teacher's Guide, 1973 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 73
Note—128p.; For 1971 Edition Student Guide, see ED 064 096; For related Teacher's Guides, see SE 021 558-563
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—Chemistry, *Integrated Curriculum, Physical Sciences, *Science Activities, Science Course Improvement Project, Science Education, Science Units, Secondary Education, *Secondary School Science, *Unified Studies Programs, Units of Study (Subject Fields)
Identifiers—*Portland Project

This teacher's guide includes parts one and two of the four-part third year Portland Project, a three-year integrated secondary science curriculum sequence. The Harvard Project Physics textbook is used for reading assignments for part one. Assignments relate to waves, light, electricity, magnetic fields, Faraday and the electrical age, electromagnetic radiation, the chemical basis of atomic theory, electrons and quanta, the Rutherford-Bohr model of the atom, and modern physical theories. The Chemical Education Materials Study (CHEMS) textbook is used for reading assignments for part two with assignments relating to many-electron atoms, ionization energy and the Periodic Table, molecules in the gas phase, and bonding in solids and liquids. The guide also contains entries on optics dealing with reflection, refraction, and images; and an extensive discussion of the electron structure and related quantum properties of the orbital model of the atom. A review of the development of the three-year program, a discussion of its rationale and the content of each of the three courses, and a three-year course subject outline are included in this volume, as well as notes to the teacher, examples of data, and problem calculations. (Author/SL)

ED 134 426 **SE 021 563**
Chemistry of Living Matter, Energy Capture & Growth, Parts Three & Four of an Integrated Science Sequence, Teacher's Guide, 1973 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 73
Note—235p.; For 1971 Edition Student Guide, see ED 064 097; For related Teacher's Guides, see SE 021 558-562
EDRS Price MF-$0.83 HC-$12.71 Plus Postage.
Descriptors—*Energy, *Integrated Curriculum, Physical Sciences, *Science Activities, Science Course Improvement Project, Science Education, Science Units, Secondary Education,

***Secondary School Science, *Unified Studies Programs, Units of Study (Subject Fields)**
Identifiers—*Portland Project

This teacher's guide includes parts three and four of the four-part third year Portland Project, a three-year integrated secondary science curriculum sequence. The underlying intention of the third year is to study energy and its importance to life. Energy-related concepts considered in year one and two, and the concepts related to atomic structure and particle phenomena considered earlier in the third year are further built upon in this volume. Chapters include: monomers and how they are built; chemistry of simple carbon compounds; polymers or stringing monomers together; polymers in 3D or the shape of things to come; where the action is - the active site; polymers to polymers; genes, proteins, and mutations; energy capture, energy consumption and metabolism, and metabolism and genes. Notes to the teacher, examples of data, and problem calculations are included. (Author/SL)

ED 142 488 SO 010 192
Stranix, Edward L.
The Cemetery: An Outdoor Classroom. A Student Workbook, Project KARE Edition.
Con-Stran Productions, Philadelphia, Pa.; Project KARE, Blue Bell, Pa.
Pub Date 74
Note—35p.; For a related document, see SO 010 193
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Death, Elementary Secondary Education, Environmental Influences, Field Trips, Human Geography, Interdisciplinary Approach, Junior High School Students, Language Arts, *Learning Activities, Mathematics, Middle Schools, Sciences, *Social Studies, Student Attitudes, *Student Projects, Urban Environment

Twenty-seven activities are suggested for middle or junior high school students to perform while visiting any local cemetery. The activities make use of skills in mathematics, language arts, social studies, science, and environmental studies. All activities require a pencil and a copy of this workbook. Other materials for specific activities include camera, tape measure, and newsprint and crayons for making rubbings. Gravestone rubbings are not only enjoyable to make, but they also allow information to be transported to the classroom in its original state. Many of the activities involve students in recording birth and death dates, comparing ages of death of men and women during various periods, analyzing epitaphs, and identifying the social causes of death such as war. An open-ended sentence completion activity encourages students to describe their feelings about death and life goals after having spent some time in the cemetery. A number of activities with a science orientation involve the students in identifying and studying the plant and animal life within the cemetery. Parts of flowers are to be identified, scientific names of leaves are to be researched, and insect life is recorded. Sketches or photos of plants, rocks, and animals are encouraged. Classes will have to make several trips to the cemetery in order to accomplish most of the activities. (AV)

ED 142 489 SO 010 193
Stranix, Edward L. Fleishmen, Michael
City Street: An Outdoor Classroom. A Student Workbook, Project KARE Edition.
Con-Stran Productions, Philadelphia, Pa.; Project KARE, Blue Bell, Pa.
Note—36p.; For a related document, see SO 010 192
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Elementary Secondary Education, Environmental Influences, Field Trips, Human Geography, Interdisciplinary Approach, Junior High School Students, Language Arts, *Learning Activities, Mathematics, Middle Schools, *Municipalities, Sciences, *Social Studies, Student Projects, *Urban Areas, Urban Environment, Urban Studies

Forty-one activities are suggested for middle or junior high school students to perform while visiting a city street. The activities make use of skills in mathematics, language arts, social studies, and environmental studies. A pencil and a copy of this workbook are essential; other materials required by some of the activities are a tape measure, magnet, and tape recorder. The students can work individually or in groups to determine the following types of information about a city block: number of windows in houses, various building materials, length of sidewalk, scientific names of trees and plants, services provided by stores and businesses, noises of different times of the day, and safest or shortest ways from home to school. Creative activities include writing a poem about the smells and sounds of the city block, creating a radio commercial to show certain aspects of the block, interviewing residents, inventing new uses for familiar objects found on the block, and mapping routes from one place to another. The authors recommend that a trip to a city street be arranged like a field trip, and that permission be obtained from school administrators and parents. (AV)

ED 162 250 CS 004 338
Ewing, J. M.
Assessing Attitudes to Reading.
Pub Date—Oct 77
Note—11p.; Paper presented at the Annual Meeting of the Reading Association of Ireland (2nd, Dublin, Ireland, October 6-8, 1977)
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—*Affective Tests, Attitudes, *Attitude Tests, Elementary Secondary Education, Foreign Countries, Interviews, *Measurement Instruments, *Rating Scales, Reading Interests, Scoring, *Student Attitudes
Identifiers—*Reading Attitudes, United Kingdom

Many measurement techniques have been developed to assess elements related to attitudes toward reading, which encompass an individual's views, feelings, values, and beliefs. Instruments developed by British teachers include Likert-type scales, a repertory grid technique, and an approach assessing reactions to screened photographs of different reading situations. Attitude assessment techniques may be divided into the following categories: interviews, which are practicable only for small sample work; Likert-type and Thurstone-type scales comprising a series of statements about reading with which pupils are required to indicate degree of agreement or disagreement; sentence completion and open-ended questioning related to attitudes toward reading; semantic differential scales, which require pupils to rate aspects of reading on each of several different scales; repertory grids, on which pupils react to statements about reading experiences; and self-reports, for which students answer a series of questions about reading situations. A model has been developed to allow for a comparison of the attitudes of individuals and groups. (The paper provides suggestions for constructing and scoring attitude measurement scales.) (GW)

ED 162 895 SE 025 419
Sagness, Richard L. Sagness, Rebecca L.
Selected Science Activities in Consumer Decision Making.
ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—76
Note—173p.
Available from—Information Reference Center (ERIC/IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, Ohio 43212 ($3.00)
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Consumer Education, Curriculum, Elementary School Science, *Elementary Secondary Education, Instruction, *Instructional Materials, *Science Activities, Science Education, Secondary School Science, *Teaching Guides

This publication has been designed for use by teachers wishing to incorporate consumer education activities into their science program. Each activity is classified by grade level most appropriate for use, area of consumer education involved, specific topic, and consumer education concept involved. Activities are designated as suitable for grades 4-6, 7-9, and 10-12 although some can be adapted for use at different grade levels. Within each grade level grouping, activities are classified as relating to the consumer and the environment, foods, advertising, tools, health, clothing, product testing, or natural resources. For those activities not developed specifically for this publication, the original source of the activity is identified. (PEB)

ED 162 897 SE 025 423
Hernbrode, William R., Ed.
Multidisciplinary Wildlife Teaching Activities.
ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—Jun 78
Note—95p.
Available from—Information Reference Center (ERIC/IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, Ohio 43212 ($3.00)
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—Art Education, *Conservation Education, English Education, *Environmental Education, Industrial Arts, Mathematics Education, *Natural Resources, *Natural Sciences, Science Education, Social Studies, *Wildlife Management, *Zoology
Identifiers—Wildlife Education

This guide provides information and activities descriptions designed to allow the teacher to use wildlife concepts in the teaching of various subjects. The author suggests that wildlife and animals are tremendous motivators for children and hold their attention. In the process, concepts of wildlife interaction with man and the environment are taught along with the major subject. The guide does not presuppose an extensive knowledge of science. In addition to activities and concepts tailored for a variety of classroom subjects, the guide provides a history of American wildlife, a presentation of basic concepts of wildlife education, and a bibliography of field guides, activities, life histories, and periodicals of interest to the classroom teacher seeking to use their technique. (RE)

ED 168 806 SE 025 283
Nuclear Science.
Pennsylvania State Dept. of Education, Harrisburg. Bureau of Curriculum Services.
Pub Date—77
Note—125p.; Appendix marginally legible
Pub Type— Guides - General (050)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Atomic Theory, Biology, Chemistry, *Curriculum, Experiments, Instructional Materials, *Laboratory Safety, *Nuclear Physics, *Physical Sciences, Physics, Science Education, *Secondary Education

This document is a report on a course in nuclear science for the high school curriculum. The course is designed to provide a basic but comprehensive understanding of the atom in the light of modern knowledge, and to show how people attempt to harness the tremendous energy liberated through fission and fusion reactions. The course crosses what are considered the normal disciplines of science, entering into the three basic fields (biology, chemistry, physics). The document includes sections on laboratory safety and health physics, sources of radioisotope licensing, textbooks and references, equipment, types of students taking the course, an outline of the course of study and its units, laboratory experiments and techniques, and a list of teaching aids. The Appendix contains the United States Nuclear Regulatory Commission Rules and Regulations. (GA)

ED 171 570 SE 027 792
Stone, Larrie And Others
Enhancing Science Instruction Through Photography.
Nebraska State Dept. of Education, Lincoln.
Pub Date—78
Note—95p.; Not available in hard copy due to copyright restrictions; Contains occasional light and broken type which may not reproduce well
Pub Type— Guides - Classroom - Teacher (052) — Guides - Classroom - Learner (051)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Curriculum Enrichment, Learning Activities, Photographic Equipment, *Photography, *Resource Guides, *Science Activities, Science Education, Secondary Education, *Secondary School Science, Teaching Techniques

This document is designed to provide teachers and students with a working knowledge of 35mm photography. Topics include Film Types and Filters, Camera and Lenses, Photomicrography, and the Darkroom. The Appendices contain science activities and projects for both teachers and students and a Bibliography provides additional sources of information. (MA)

ED 175 723 **SE 028 806**
Bennett, Dean B. Zoltir, Samuel
Student Study Guide - Water Quality Monitoring Approach to Watershed Studies. Presumpscot River Education Project.
Maine Association of Conservation Commissions, Augusta.; Maine Univ., Portland-Gorham.
Spons Agency—Office of Education (DHEW), Washington, D.C. Office of Environmental Education.
Pub Date—75
Grant—G007407348
Note—59p.; Contains occasional light and broken type
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Ecology, *Environment, *Environmental Education, *Environmental Influences, Higher Education, *Pollution, *Science Education, Secondary Education, Undergraduate Study, *Water Pollution Control, Water Resources
Identifiers—*Monitoring

This guide is designed for both independent study and class use. It provides the basis for a unit in a science class for the secondary school level. At the undergraduate college level, it provides an outline of activities for a contract as part of an education or science course. The lessons in the guide concentrate on the application of science skills and concepts in identifying and solving water and land environmental problems. (Author/RE)

ED 178 267 **SE 028 460**
Hathway, James A., Ed.
Individualized Testing System: Performance Objectives, ISCS Level I.
Florida State Univ., Tallahassee. Curriculum Study Center.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—73
Note—62p.; For related documents, see SE 028 461-488; Contains light and broken type
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Academic Achievement, Course Evaluation, *Course Objectives, Elementary Secondary Education, *Evaluation, *Individualized Programs, Inservice Teacher Education, Junior High Schools, Performance Tests, *Science Course Improvement Project, Science Curriculum, Science Education, Science Materials, Science Tests, Student Evaluation, *Teaching Guides, *Tests
Identifiers—*Intermediate Science Curriculum Study, *National Science Foundation

This is one of four major subdivisions of a set of individualized evaluation material for Level I of the Intermediate Science Curriculum Study (ISCS) developed as a part of the ISCS Individualized Teacher Preparation (ITP) program. The manual contains a composite list of selected measurable objectives for Level I of the ISCS program. It is primarily a reference book for persons responsible for examining curricula and determining if this program is likely to meet their school system's objectives and needs. The listed objectives, which are divided into ten units, are designed to aid in the assessment of students who differ widely in their learning abilities and in the kinds of subject matter which they find difficult. Most units include two chapters and the related excursions. Within each unit, the objectives based on the core and the remedial excursions of the student materials are listed first, and roughly, in the order of their development in the student materials. These are followed by the objectives for the general and enrichment excursions. (Author/HM)

ED 179 402 **SE 029 355**
Science Objectives for the Third Assessment.
Education Commission of the States, Denver, Colo. National Assessment of Educational Progress.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—79
Contract—OEC-0-74-0506
Note—68p.
Pub Type— Reports - Descriptive (141)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Affective Objectives, *Cognitive Objectives, *Educational Assessment, Elementary Secondary Education, Inquiry Training, Performance Criteria, Process Education, *Science Education, *Skill Development, Values
Identifiers—*National Assessment of Educational Progress

Presented is background information related to the third round of science assessment activities (1976-77) conducted by the National Assessment of Educational Progress (NAEP). Chapter one contains a description of the overall assessment plan, the general framework of objectives, criteria for selecting objectives, and procedures used for developing specific learner outcomes. Chapter two is focused on the cognitive domain while chapter three relates to attitudes, values, and experiences. Three appendices are included: (1) 1976-77 sample objectives, (2) a list of science consultants, and (3) objectives from cycles I and II. A short bibliography is included. (SA)

ED 180 778 **SE 029 407**
Fedorak, Allen And Others
Senior Science Enrichment Modules. S.S.T.A. Research Centre Report No. 58.
Saskatchewan School Trustees Association, Regina.
Pub Date—Nov 78
Note—285p.; Not available in hard copy due to marginal legibility of original document
Available from—The Research Centre, Saskatchewan School Trustees Association, 570 Avord Tower, Regina, Saskatchewan, Canada ($6.50)
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Interdisciplinary Approach, *Learning Modules, Problem Solving, Science Activities, *Science Curriculum, Scientific Enterprise, Secondary Education, *Secondary School Science, Teaching Guides, Technology, *Values

Presented is a set of learning modules intended for teaching science to students in grades eleven and twelve. Each module incorporates problem solving using the scientific viewpoint and emphasizing the interface between science and society. The fifteen modules presented include the following topics: group dynamics; the value of science; a puzzle entitled "The Lebon Prize"; a role playing experience called "Dr. Stuffy"; nuclear power; the Herzberg lecture on boundaries of knowledge; lifeboat ethics; early science and the nature of matter; Plato, Aristotle and Ptolemy; Copernicus; Galileo; Newton; relativity; twenty ways the world could end; and a theory today. Each module is intended to last approximately one hour. An evaluation of the project is given at the back of the text. The appendices contain a preference survey and a student opinionnaire. (SA)

ED 190 360 **SE 031 304**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Student Guide: Environmental Science. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—160p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—Environmental Education, Grade 9, *Individualized Instruction, Industry, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Natural Resources, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Water Pollution
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of one of the Intermediate Science Curriculum Study (ISCS) units for level III students (grade 9). The chapters contain basic information about environmental pollution and hazards, activities related to the subject, and optional excursions. A section on introductory notes to the student discusses how to use the book and how the class will be organized. Data tables and empty spaces within the workbook format indicate where responses are expected. Illustrations accompany all instructions and the students are encouraged to select the proper equipment based on the illustrations. (SA)

ED 190 361 **SE 031 305**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Teacher's Edition: Environmental Science. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—168p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—Environmental Education, Grade 9, *Individualized Instruction, Industry, Instructional Materials, Junior High Schools, Laboratory Manuals, Laboratory Procedures, Natural Resources, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Water Pollution
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of one of the eight units of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). This unit and its activities focuses on environmental pollution and hazards. Optional excursions are suggested for students who wish to study an area in greater depth. An introduction describes the problem of air pollution, pesticides, water pollution, and population increases. Illustrations accompany the text. (SA)

ED 190 362 **SE 031 306**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Student Guide: Environmental Science. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—78p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Environmental Education, Grade 9, *Individualized Instruction, Industry, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, Natural Resources, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book which accompanies the unit "Environmental Science" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the student's text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 363 **SE 031 307**
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Teacher's Edition: Environmental Science. Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation,

Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—79p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains colored print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Answer Sheets, Environmental Education, Grade 9, Individualized Instruction, Industry, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Natural Resources, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "Environmental Science" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the student text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and excursions. A self evaluation section is followed by its answer key. (SA)

ED 191 676 **SE 031 746**
Program of Studies–Science, 9-12.
Montgomery County Public Schools, Rockville, Md. Dept. of Instructional Planning and Development.
Pub Date—79
Note—36p.; For related documents, see SE 031 745. Contains occasional light and broken type.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Course Objectives, *Curriculum Guides, High Schools, *Science Curriculum, Science Education, Science Instruction, Secondary Education, *Secondary School Science

Described is the ninth- through twelfth-grade science program of the Montgomery County Public Schools, Rockville, Maryland. This program provides opportunities for students to experience individual interests and career choices. Two credits in science are taken in grades nine through twelve and generally include laboratory science and biology. Most students elect to take more than one additional science course. The secondary science course electives available to the students include Biology 2, Chemistry 1 and 2, Earth Science, Environmental Science, Horticultural Science, Physical Science 1 and 2, Physics 1 and 2, Laboratory Sciences, Anatomy and Physiology, Applied Science and Aviation Science. Also included is information describing each course and a listing of learning objectives for each course. (DS)

ED 191 692 **SE 031 776**
Kelner, Bernard G. Hofkin, Fred M.
Key Competencies, Science Education: Secondary Schools (Junior High, J-G Sci) (Senior High, S-Bio).
Philadelphia School District, Pa. Office of Curriculum and Instruction.
Pub Date—80
Note—63p.; For related document, see SE 031 775.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Behavioral Objectives, Biology, *Board of Education Policy, Competency Based Education, General Science, Junior High Schools, *Science Curriculum, Science Education, *Science Instruction, Secondary Education, *Secondary School Science

Presented is a list of behavioral objectives which can be used to evaluate mastery of the competency of students in junior high school science and senior high school biology. These competencies were prepared by the School District of Philadelphia. The lists are comprehensive and coded for easy reference. (CS)

ED 193 048 **SE 032 947**
Helmick, Robert And Others
Environmental I.D.E.A.S. Clusters 10, 11, 12, Physical Sciences. Preliminary Edition.
Polk County Board of Public Instruction, Bartow, Fla.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—Jun 77
Note—122p.; Not available in hard copy due to marginal legibility of original document. Best copy available.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Chemistry, *Earth Science, *Environmental Education, *Natural Resources, Resource Units, Science Education, Science Instruction, Scientific Concepts, *Secondary Education, *Social Studies
Identifiers—*Environmental Problems

Approximately 30 experiments related to environmental problems comprise this manual. The three conceptual themes under which these lessons are organized deal with: (1) change; (2) the interaction of custom, rule, and law in society; and (3) economy, life style, and individual attitudes. Provided are materials for both students and teachers. Teacher materials include background information, student objectives, references, and conceptual theme statement. Listed in the student materials are the problem, materials needed, procedure, discussion questions, and suggested follow-up experiments. (WB)

ED 196 699 **SE 033 638**
7-9 Science.
Manitoba Dept. of Education, Winnipeg.
Pub Date—79
Note—242p.; For related documents, see SE 033 635-637.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC10 Plus Postage.
Descriptors—Curriculum Guides, Instructional Materials, Objectives, *Science Curriculum, Science Education, Science Instruction, Secondary Education, *Secondary School Science, *State Curriculum Guides, *Teaching Methods

This science curriculum guide for grades 7-9, developed by the Manitoba Department of Education, attempts to correlate information known about the intellectual and social development of young adolescents with the nature of science education. The curriculum provides opportunities for students to examine how humans grow and develop, how humans differ from and resemble each other, and how humans differ from and resemble other organisms. Another emphasis is placed upon environmental education, in which topics such as energy conversion, alternative energy sources, and the role of energy conservation are explored. Skills emphasized include the selection and ordering of data, the determination of the effect of variables, and how evidence is weighed. Core objectives are provided for each grade level, classified by subject area and identified as concept or process objectives or psychomotor skills. (Author/CS)

Secondary

Physics/Physical Science

ED 052 002 SE 010 155
DISCUS Eighth Grade, Physical Sciences, Part I.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date Sep 69
Note—174p.; Revised September 1, 1969
Available from—DISCUS, 1011 Gilmore Street, Jacksonville, Florida 32204
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Disadvantaged Youth, *Instructional Materials, Laboratory Procedures, *Physical Sciences, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the first volume of a two volume, one year program in physical science, and contains these five units and activities: First Class Levers, six activities; Inclined Plane, six activities; The Pulley, three activities; Friction, five activities; and Heat, nine activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally has a list of required equipment for small group activities, introduction and procedures, and fill-in questions relating to the completed activity. The volume begins with extensive "guidelines for creating an appropriate classroom environment for educationally disadvantaged youth." The appendix includes an equipment list, and for each activity there is a full page diagram for making overhead projector transparencies. (PR)

ED 052 003 SE 010 156
DISCUS Eighth Grade, Physical Sciences, Part 2.
Duval County School Board, Jacksonville, Fla. Project DISCUS.
Pub Date [69]
Note—132p.
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Disadvantaged Youth, *Instructional Materials, Laboratory Procedures, *Physical Sciences, Science Activities, *Secondary School Science, *Teaching Guides

Included are instructional materials designed for use with disadvantaged students who have a limited reading ability and poor command of English. The guide is the second volume of a two volume, one year program in physical science, and contains these four units and activities: Buoyancy, nine activities; Solubility, six activities; Crystals and Crystal Growing, seven activities; and Using Electricity, eight activities. A formal textbook is not used in this program, and the learning process relies on class discussion supported by audiovisual materials and small group laboratory activities. Each lesson has a suggested format for teachers to follow in directing activities, with suggested teacher comments. Following each teacher section is the printed material for student use, which generally has a list of required equipment for small group activities, introduction and procedures, and fill-in questions relating to the completed activity. One or more full page diagrams for making transparencies for overhead projection are included for most of the activities. (PR)

ED 053 931 24 SE 012 308
Pfeiffer, Carl H.
Matter-Energy, and the Process of Change. Science I and IA.
Monona Grove High School, Monona, Wis.; Wisconsin State Dept. of Education, Madison.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-0646
Pub Date 68
Note—355p.; Due to copyright restrictions, some pages are not included
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Fused Curriculum, *Instructional Materials, *Integrated Curriculum, Interdisciplinary Approach, *Physical Sciences, *Science Activities, Scientific Principles, Secondary School Science, Workbooks

The two student notebooks in this set provide the basic course outline and assignments for the first year of a four year senior high school unified science program. The first volume consists of these three units: The Universe and Man; Man's Attempt to Understand and Relate to the Process of Change; and Man's Ideas About the Structure of Matter. Included in the second volume are these units: The Role of Energy and Time in the Process of Change, Interactions Resulting in Physical Change, and Interactions Resulting in Chemical Change. The materials for each of the sub-units found in the notebook include: a list of required and recommended readings from various other books; questions for consideration in introducing a lesson; a brief background reading; a basic outline of the lectures with space provided within the outline for notes; laboratory activities and investigations; laboratory problem reports and other kinds of assignments (discussion questions, completion questions, problems); and summary statements and review questions. Numerous diagrams and illustrations are included. (PR)

ED 063 465 VT 015 229
Industrial Prep, Volume Three, Junior Year—Contents: Physics and English.
Hackensack Public Schools, N.J.
Report No—CVTE-E-8
Note—396p.; PAES Collection
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Audiovisual Aids, Behavioral Objectives, Bibliographies, *Career Education, Curriculum Guides, Developmental Programs, *English Curriculum, Grade 11, Instructional Aids, *Interdisciplinary Approach, Occupational Guidance, *Physics Curriculum, Project Training Methods, Self Concept, Student Projects, *Teaching Guides, Teaching Procedures, Vocational Education, Worksheets
Identifiers—Career Exploration, Economic Awareness

This Grade 11 teaching guide contains two curriculums which focus on 10 team physics projects and five thematic units in English. The 10 group physics projects are derived from the application of three laboratory units on the properties of matter, mechanics, and electricity. The outlined English curriculum ranges from such specifically pragmatic topics as work preparation and physics to more broadly applicable units on television, economics, and prejudice, stressing relevance to the needs and interests of vocational students. The extensive economics unit deals with consumer credit and buying used cars. The unit on prejudice outlines the causes and effects of social discrimination, provides literary illustrations with suggested projects and a bibliography, and discusses prejudice in mass media. Multimedia resources and ideas for the guide include project lists, discussion questions, visual aids, and student reading materials. Procedures for implementing goals include use of student worksheets for each physics lesson, a student evaluation sheet, term definitions, and detailed daily lesson plans in outline form. Developed by a group of educators from Hackensack High School, New Jersey, this is the third volume in a comprehensive 3-year interdisciplinary program in industrial preparation for vocational students. Others are available as VT 015 227-VT 015 231 in this issue. (AG)

ED 064 095 SE 013 704
Motion and Energy Chemical Reactions, Parts One & Two of an Integrated Science Sequence, Student Guide, 1971 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—150p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Chemistry, Conceptual Schemes, Energy, Instructional Materials, *Integrated Curriculum, Interdisciplinary Approach, Science Activities, *Secondary School Science, *Unified Studies Programs
Identifiers—*Portland Project

This student guide is for the second year of the Portland Project, a three-year integrated secondary school science curriculum. "Motion and Energy," the first of the two parts in this volume, begins with the study of motion, going from the quantitative description of motion to a consideration of what causes motion and a discussion of Newton's laws. There follows the development of the laws of conservation of momentum and energy, including a discussion of energy in biological systems, and culminating with a discussion of the kinetic molecular theory. The major objective of "Chemical Reactions," part two, is to build some of those basic chemical concepts that are necessary for the analytical approach in parts three and four of the third year course: "The Chemistry of Living Matter" and "Energy Capture and Growth." Some of the topics considered in part two include the mole concept, equation writing, energetics associated with chemical reactions, the dynamic nature of particles and their interactions, and the application of energy and equilibrium to chemical systems. The Harvard Physics Project textbook and the Chemical Educational Materials Study (CHEMS) textbook are used for most of the reading assignments in the second year course. A review of the development of the three-year program, its rationale and content, and a three-year course subject outline are included. (Also see SE 013 702, SE 013 703, SE 013 705, and SE 013 706.) (Author/PR)

ED 064 096 SE 013 705
Waves and Particles—The Orbital Atom, Parts One & Two of an Integrated Science Sequence, Student Guide, 1971 Edition.
Portland Project Committee, Oreg.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 71
Note—111p.
EDRS Price MF-$0.65 HC-$4.58
Descriptors—*Atomic Theory, Chemistry, Conceptual Schemes, *Energy, Instructional Materials, *Integrated Curriculum, Interdisciplinary Approach, Optics, *Secondary School Science, *Unified Studies Programs
Identifiers—Portland Project

The third year of the Portland Project, a three-year secondary school curriculum in integrated science, consists of four parts, the first two of which are covered in this student guide. The reading assignments for part one, "Waves and Particles," are listed in the student guide and are to be read in the Harvard Project Physics textbook. The assignments relate to these topics: waves, light, electricity and magnetic fields, Faraday and the electrical age, electromagnetic radiation, the chemical basis of atomic theory, electrons and quanta, the Rutherford-Bohr model of the atom, and some ideas from modern physical theories. Topics for part two, "The Orbital Atom," are read from the Chemical Educational Materials Study (CHEMS) textbook and include: many-electron atoms, ionization energy and the periodic table, molecules in the gas phase, and the bonding in solids and liquids. In addition to the reading assignment lists, the student guide contains two major entries: an experiment on optics dealing with reflection, refraction, images and related factors; and an extensive discussion of the electron structure and related quantum properties of the orbital model of the atom. A review of the development of the three-year program, a discussion of its rationale and the content of each of the three courses, and a three-year course subject outline are included. (For more information on

the Portland Project see SE 013 702, SE 013 703, SE 013 704, and SE 013 706.) (PR)

ED 070 671 SE 015 488
Kuczma, R. M.
Individualized Instruction in Science, Introductory Physical Science, Learning Activity Packages.
Eastchester Public Schools, N. Y.
Pub Date [72]
Note—64p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Grading, Individualized Instruction, *Individualized Programs, *Instructional Materials, *Physical Sciences, Remedial Instruction, *Science Activities, Secondary Grades, *Secondary School Science
Identifiers—Eastchester New York Schools, Learning Activity Packages

Learning Activity Packages (LAP) mostly relating to the Introductory Physical Science Text are presented in this manual for use in sampling a new type of instruction. The total of 14 topics are incorporated into five units: (1) introduction to individualized learning; (2) observation versus interpretation; (3) quantity of matter; (4) introduction to atoms, compounds, and elements; and (5) models of matter. Brief descriptions are included of LAP, activity in chemistry laboratory, metric system, mass and volume, and a review of atoms and molecules. A set of directions for fulfilling specific objectives is given for each topic, making it possible for students to learn on their own as individuals. Among these, some are specially designed and others are identified in connection with the content of "Modern Chemistry; Terms, Tables, and Skills," by B. J. Woodruff, and "-Modern Physical Science" by Brooks and others. In the course of learning, besides keeping a notebook and vocabulary sheets, the students are asked to take pretests, self-evaluation tests, and posttests. Students' grades are assigned on the basis of the amount of their work, posttest results, and work habits and attitudes. Also included are two remedial units dealing with calculation with decimals and standard scientific notation of numbers. (CC)

ED 070 672 SE 015 489
Kuczma, R. M.
Individualized Instruction in Science, Time-Space-Matter, Learning Activity Packages.
Eastchester Public Schools, N. Y.
Pub Date [72]
Note—55p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Earth Science,. Individualized Instruction, *Individualized Programs, Instructional Materials, *Learning Activities, *Lunar Research, *Secondary Grades, Secondary School Science, Teaching Methods
Identifiers—Eastchester New York Schools, Learning Activity Packages

Learning Activity Packages (LAP) relating to time, space, and matter are presented for use in sampling a new type of learning for a whole year. Besides the unit on introduction to individualized learning, 11 major topics are incorporated into three other units: (1) observation of the physical world, (2) space and exploration for environmental benefit of earth, and (3) exploring the planet earth. A set of self-directed activities is given in each topic, leading the students to learn on their own and participate in class discussions. Most activities are adopted from the content of earth science textbooks, while others are in connection with selected filmstrips and science series. Excerpts concerning the importance of information gained from moon, learning from the moon, geology of Apollo 15 moon landing site, man's changing view of the earth, and keeping up to date on the moon are included along with a message to citizens of tomorrow. Pretests, self-evaluation tests, and posttests are used in evaluation. As appendices, two remedial units dealing with calculation with decimals and scientific notation of numbers are provided. (CC)

ED 070 673 SE 015 490
Kuczma, R. M.
Individualized Instruction in Science, Time-Space-Matter, Self-Directed Activities.
Eastchester Public Schools, N. Y.
Pub Date [72]
Note—57p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Earth Science, *Individualized Instruction, Individualized Programs, Instructional Materials, *Laboratory Procedures, *Learning Activities, Lunar Research, *Secondary Grades, Secondary School Science, Teaching Methods
Identifiers—Eastchester New York Schools, Learning Activity Packages

As a supplement to Learning Activity Packages (LAP) on the time-space-matter subject, details are presented for self-directed activities. Major descriptions are given on the background of LAP characteristics, metric system, profile graph construction, spectroscope operation, radiant energy measurement, sunspot effects, density determination, dimensions of the earth, and radius computation by use of shadows. The remaining LAPs grouped in the experiment category are concerned with the moon's origin and characteristics, radiation aspects, and identification of rocks and minerals. Tables of average summer temperatures in New Haven and annual sunspot numbers are included. Also provided is a list of slides on Apollo missions. (CC)

ED 070 674 SE 015 491
Kuczma, R. M.
Individualized Instruction in Science, Earth Space Project, Learning Activities Package.
Eastchester Public Schools, N. Y.
Pub Date [72]
Note—50p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Aerospace Education, *Earth Science, Individualized Instruction, *Individualized Programs, Instructional Materials, *Learning Activities, *Secondary Grades, Secondary School Science, *Space Sciences, Teaching Methods
Identifiers—Eastchester New York Schools, Learning Activity Packages

Learning Activity Packages (LAP) relating to the earth and space are presented for use in sampling a new type of learning for a whole year. Eighteen topics are incorporated into five units: (1) introduction to individualized learning, (2) observation versus interpretation, (3) chemistry in the space age, (4) the space age interdisciplines, and (5) humanities and space. A set of self-directed activities is given in each topic, leading students to learn on their own and enter into group discussions. Most activities are especially designed for the purpose and given in separated sheets, while others are in connection with textbooks such as "Investigating the Earth"; "Time, Space, Matter"; "Modern Chemistry" by Metcalfe and others; "Science and Serendipity" by Halacy, Jr.; Apollo missions' slides, etc. Pretests, self-evaluation tests, and posttests are used in evaluation. Also included in the appendices are two remedial units dealing with calculation with decimals and scientific notation of numbers. (CC)

ED 070 675 SE 015 492
Kuczma, R. M.
Individualized Instruction in Science, Earth-Space Project, Self-Directed Activities.
Eastchester Public Schools, N. Y.
Pub Date 72
Note—59p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Earth Science, *Individualized Instruction, Individualized Programs, *Instructional Materials, Learning Activities, Science Activities, Secondary Grades, *Secondary School Science, *Space Sciences
Identifiers—Eastchester New York Schools, Learning Activity Packages

As a supplement to Learning Activity Packages (LAP) of the earth-space project, this manual presents self-directed activities especially designed for individualized instruction. Besides an introduction to LAP characteristics, sets of instructions are given in connection with the metric system, the earth's dimensions, indirect evidence for atomic theory, atomic radius, spectral analyses of energy levels, ionization potential, esters, relationship between a candle and a star, heat content of a candle, mass number, periodic table, photosynthesis, format for term investigation, and precautions in chemistry laboratory. Also included are the following excerpts: Why Support Science?; Living Dangerously in the Age of Science; Point of View (on science development); Will the World Come to a Horrible End?; A Fish Story; and One Small Step--One Giant Leap. Student evaluations are made by using pretests, self-evaluation tests, and post-tests. (CC)

ED 070 909 AC 014 051
Speed, Acceleration, and Velocity: Level II. Unit 9, Lesson 1; Force, Mass, and Distance: Lesson 2; Types of Motion and Rest: Lesson 3; Electricity and Magnetism: Lesson 4: Electrical, Magnetic, and Gravitational Fields: Lesson 5; The Conservation and Conversion of Matter and Energy: Lesson 6; Simple Machines and Work: Lesson 7; Gas Laws: Lesson 8: Principles of Heat Engines: Lesson 9: Sound and Sound Waves: Lesson 10; Light Waves and Particles: Lesson 11; Program. A High.....
Manpower Administration (DOL), Washington, D. C. Job Corps.
Report No—PM-431-61; PM-431-62, PM-431-63, PM-431-64; PM-431-65; PM-431-66, PM-431-67; PM-431-68; PM-431-69, PM-431-70; PM-431-71; PM-431-72
Pub Date Nov 69
Note—433p.
EDRS Price MF-$0.65 HC-$16.45
Descriptors—*Academic Education, Achievement Tests, *Autoinstructional Aids, *Course Content, Credit Courses, *General Education, *Independent Study, Physics, Secondary Grades

This self-study program for high-school level contains lessons on: Speed, Acceleration, and Velocity; Force, Mass, and Distance; Types of Motion and Rest; Electricity and Magnetism; Electrical, Magnetic, and Gravitational Fields; The Conservation and Conversion of Matter and Energy; Simple Machines and Work; Gas Laws; Principles of Heat Engines; Sound and Sound Waves; Light Waves and Particles; and The Behavior of Light Rays. Each of the lessons concludes with a Mastery Test to be completed by the student. (DB)

ED 071 882 SE 015 519
Project Physics Reader 1, Concepts of Motion.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 67
Contract—OEC-5-10-058
Note—181p.; Preliminary Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Force, *Instructional Materials, Kinetics, *Motion, *Physics, *Secondary School Science, *Supplementary Reading Materials
Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 1, 21 articles are presented in this reader. Concepts of motion are discussed under headings: motion, motion in words, representation of movement, introducing vectors, Galileo's discussion of projectile motion, Newton's laws of dynamics, the dynamics of a golf club, report on Tait's lecture on force, and bad physics in athletic measurements. The remaining excerpts and book passages are related to the value of science, close reasoning, scientific method, problem-solving techniques, advice on planning a career in sciences, right size of animals, scientific revolution, effects of the rise of physics in the age of Galileo and Newton, fun in space, vision of our age, making of a scientist, and chart of the future. Also included are illustrations for explanation purposes. The work of Harvard Project Physics has been financially supported by the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 883 SE 015 520
Project Physics Tests 1, Concepts of Motion.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 67
Contract—OEC-5-10-058

Note—46p.; Preliminary Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Force, Kinetics, Measurement, *Motion, *Physics, Problem Sets, Secondary Grades, Secondary School Science, *Tests
Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 1 are presented in this booklet, consisting of 70 multiple-choice and 20 problem-and-essay questions. Concepts of motion are examined with respect to velocities, acceleration, forces, vectors, Newton's laws, and circular motion. Suggestions are made for time consumption in answering some items. Besides directions and illustrations for explanation purposes, related physical constants and equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 884 SE 015 521
Project Physics Handbook 1, Concepts of Motion.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—73p., Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Experimental Teaching, Force, Instructional Materials, Kinetics, *Laboratory Experiments, *Motion, *Physics, Science Activities, Secondary Grades, Secondary School Science, Time
Identifiers—Harvard Project Physics

Thirteen experiments and 15 activities are presented in this unit handbook for student use. The experiment sections are concerned with naked-eye observation in astronomy, regularity and time, variations in data, uniform motion, gravitational acceleration, Galileo's experiments, Newton's laws, inertial and gravitational mass, trajectories, and circular motion. Suggestions for demonstrations, construction projects, and self-directed instructions are given in the activity sections to deal with aspects of stroboscopes, frictionless pucks, air resistance, time determination, falling weights, accelerometers, projectile motion, motion in a rotating reference frame, centripetal forces, and harmonograms. Methods of keeping records, using the Polaroid Camera, and physics readers are discussed in the introductory section. The four chapters in the handbook are designed to correspond to the text, with complete instructions in each experiment. Some experiments and activities are suggested in assignments, and the remaining are open to students' free selection. Illustrations and film loop notes for explanation purposes are included. Additional suggestions for activities, a guide for planet and eclipse observations, and the best time for viewing meteor showers are also provided as appendices. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 885 SE 015 522
Project Physics Text 1, Concepts of Motion.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—138p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Force, Instructional Materials, Kinetics, *Motion, *Physics, Secondary Grades, *Secondary School Science, Textbook Content, *Textbooks, Time
Identifiers—Harvard Project Physics

Fundamental concepts of motion are presented in this first unit of the Project Physics textbook. Descriptions of motion are made in connection with speeds, accelerations, and their graphical representation. Free-fall bodies are analyzed by using Aristotle's theory and Galileo's work. Dynamics aspects are discussed with a background of mass, force, vectors, laws of motion, equilibrium forces, weight, gravitation, and nature's basic forces. Further information is given in terms of the earth-moon trip, path of a projection, Galilean relativity, circular motion, centripetal acceleration, motion of earth satellites, and simple harmonic motion. Historical developments are stressed in explanation of concepts. A description of Fermi's work and tables of man's place in time and space are included in the prologue. Questions are given at the end of each section as well as at the end of the whole text. Besides illustrations for explanation use, brief answers to the questions are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 886 SE 015 523
Project Physics Teacher Guide 1, Concepts of Motion.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—384p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Curriculum, Force, *Instructional Materials, Kinetics, *Motion, *Physics, Secondary Grades, *Secondary School Science, *Teaching Guides
Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 1 are presented in this manual to help teachers make effective use of learning materials. Curriculum objectives are discussed in connection with instructional materials, suggested year time schedules, multi-media schedules, schedule blocks, resource charts, and experiment summaries. Brief analyses are included for transparencies, reader units, programmed instruction, and 16mm films. Also included is information about the background and development of each text section, procedures and equipments used and an explanation of film loops. Solutions to the study guide are given in detail, and brief answers to test items are provided along with proportions of correctly answering test samples. The first unit of the text, with marginal notes, is also compiled in the manual. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 887 SE 015 524
Project Physics Reader 2, Motion in the Heavens.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—233p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$9.87
Descriptors—Astronomy, Instructional Materials, *Motion, *Physics, Science Fiction, Science Materials, Secondary Grades, *Secondary School Science, *Space, *Supplementary Reading Materials
Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 2, specially selected articles are presented in this reader for student browsing. Eight excerpts are given under headings: the starry messenger, Newton and the principia, an appreciation of the earth, space the unconquerable, "Is there intelligent life beyond the earth?," the life story of a galaxy, expansion of the universe, and Dyson sphere. Seven book passages are included under the headings of the black cloud, roll call, a night at the observatory, Kepler's celestial music, universal gravitation, a table of stars within twenty-two light years that could have habitable planets, and three poetic fragments about astronomy. The remaining articles include a preface to the books of the revolutions, Kepler, Kepler on Mars, laws of motion and proposition one, garden of Epicurus, a search for life on earth at Kilometer resolution, the boy who redeemed his father's name, great comet of 1965, gravity experiments, unidentified flying objects, and negative mass. Illustrations for explanation purposes are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 888 SE 015 525
Project Physics Tests 2, Motion in the Heavens.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—26p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Achievement Tests, *Astronomy, Evaluation, Instructional Materials, Multiple Choice Tests, Physical Sciences, *Physics, Secondary Grades, *Secondary School Science, *Testing
Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 2 are presented in this booklet. Included are 70 multiple-choice and 22 problem-and-essay questions. Concepts of motion in the heavens are examined for planetary motions, heliocentric theory, forces exerted on the planets, Kepler's laws, gravitational force, Galileo's work, satellite orbits, Jupiter's moons, Tycho's observations, stellar parallax, and historical descriptions in astronomy. Suggestions are made for time consumption in answering some items. Besides directions and illustrations for explanation purposes, related physical constants and equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 889 SE 015 526
Project Physics Handbook 2, Motion in the Heavens.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—81p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Astronomy, Instructional Materials, *Laboratory Experiments, Laboratory Manuals, *Physics, *Science Activities, Science Experiments, Secondary Grades, *Secondary School Science
Identifiers—Harvard Project Physics

Nine experiments and 17 activities are presented in this handbook. The experiments are related to the earth's size and orbit, Piton height, telescope operations, Mars and Mercury orbits, stepwise approximation, and models of comet orbits. Further naked-eye observations in astronomy are designed in connection with the sun, moon, and planet positions. The activities are concerned with sunspots, Foucault pendulum, three-dimensional orbits, satellite and comet orbits, Galileo's work, forces on a pendulum, angular measurements, analemma, epicycles, retrograde motions, armillary sphere, sidereal days, scale model of the solar system, and summary of physics learning in the Japanese haiku form. Self-directed instruction, demonstrations, and construction projects are stressed in these activities. The four chapters in the handbook are arranged to correspond to the text materials, with complete instructions in each experiment. Some experiments and activities are suggested for assignment, and the remaining are used at student discretion. Besides illustrations and film loop notes for explanation use, a table of planet longitudes, a guide for planet and eclipse observations, and a set of review problems are included. Additional suggestions for activities are given in the appendix. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 890 SE 015 527
Project Physics Text 2, Motion in the Heavens.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—146p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Astronomy, Instructional Materials, Physical Sciences, *Physics, Science Activities, *Scientific Concepts, Secondary Grades, Secondary School Science, *Textbooks
Identifiers—Harvard Project Physics

Astronomical fundamentals are presented in this unit of the Project Physics text for use by senior high students. The geocentric system of Ptolemy is discussed in connection with Greek concepts including Aristarchus' heliocentric hypothesis. Analyses are made of Copernicus' reexamination, leading to Tycho's observations and compromise system. A new universe is introduced by using Kepler's laws and Galileo's work. Terrestrial and celestial dynamics are synthesized by reviewing Newton's concepts about motions under central forces, inverse-square law, and earthly motions, and application of Newton's theories to heavenly events are discussed. The text unit is concluded by an explanation of the making of theories. Historical developments are stressed to help students understand the way in which science influences man's activities. Also included in the unit are a chart of renowned people's life spans in the emerging Renaissance culture and tables of planets and their satellites. Problems with their answers are provided in two categories: study guide and end of section questions. Besides illustrations for explanation purposes, a glossary of general terms is given in the appendix. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 891 SE 015 528
Project Physics Teacher Guide 2, Motion in the Heavens.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—346p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$13.16
Descriptors—*Astronomy, Instructional Materials, *Multimedia Instruction, Physical Sciences, *Physics, Science Activities, Secondary Grades, *Secondary School Science, *Teaching Guides
Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 2 are presented to help teachers make effective use of learning materials. The unit contents are discussed in connection with teaching aid perspectives, multi-media schedules, schedule blocks, and resource charts. Analyses are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, demonstration methods, apparatus operations, notes on the student handbook, and explanation of film loops. Additional articles deal with calendars, armillary sphere, epicycles, "chase problem," atmospheric refraction, relations in an ellipse, moon's irregular motion, initial and gravitational mass, G measuring, and "true" scale of sun, moon, and earth. A redesigned epicycle machine is analyzed, and a bibliography of reference texts and periodicals is given. Solutions to study guide problems in the text and review problems in the handbook are provided in detail along with suggested answers to test items. The second unit of the text, with marginal notes on each section, is also compiled in this guide. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 892 SE 015 529
Project Physics Reader 3, The Triumph of Mechanics.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—261p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$9.87
Descriptors—Energy, Heat, *Instructional Materials, Kinetic Molecular Theory, *Kinetics, *Physics, Science Materials, Secondary Grades, Secondary School Science, *Supplementary Reading Materials
Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 3, a collection of articles is presented in this reader for student browsing. Four excerpts are given under the following headings: On the kinetic theory of gases, Maxwell's Demon, Introduction to Waves, and Scientific Cranks. Five articles are included in terms of energy, barometers, randomness, fiddle family, and seven fallacies in science. The ten remaining book passages are related to silence production, steam engines, molecular theory of gases, disorder phenomena, statistical laws, arrow of time, James Clerk Maxwell's discoveries, wave concept, wave motion in acoustics, and musical instruments and scales. Illustrations for explanation purposes are also provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 893 SE 015 530
Project Physics Tests 3, The Triumph of Mechanics.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—24p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Achievement Tests, Heat, Instructional Materials, Kinetic Molecular Theory, *Kinetics, *Physics, Secondary Grades, *Secondary School Science, *Testing, Thermodynamics
Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 3 are presented in this booklet. Included are 70 multiple-choice and 20 problem-and-essay questions. Concepts of mechanics are examined on energy, momentum, kinetic theory of gases, pulse analyses, "heat death," water waves, power, conservation laws, normal distribution, thermodynamic laws, and wave reflection, refraction, interference, and diffraction. Suggestions are made for time consumption in answering some items. Besides directions and illustrations for explanation purposes, related physical constants, units, and equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 894 SE 015 531
Project Physics Handbook 3, The Triumph of Mechanics.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—125p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Energy, Instructional Materials, Kinetic Molecular Theory, Laboratory Experiments, *Laboratory Manuals, *Physics, Science Activities, *Science Experiments, Secondary Grades, *Secondary School Science
Identifiers—Harvard Project Physics

Ten experiments and 27 activities are presented in this handbook. The experiments are related to collisions, energy conservation, speed measurements, thermometry, calorimetry, gas properties, wave motions, and acoustic problems. The activities are concerned with stroboscopic photographs in collision, elastic impact, mass conservation, exchange of momentum, Heron's engine, gravitational acceleration, energy in a pendulum, Crooke's radiometer, mechanical equivalent of heat, gas theories, speed distribution, rockets, perpetual motion machines, "Least-Time" or "Least-Energy" situations, standing waves, Moire patterns, music and speech, and speed of sound. Demonstrations, construction projects, and self-directed instructions are stressed in these activities. The four chapters in the handbook are designed to correspond to the text, with complete instructions in each experiment. Some experiments and activities are suggested for assignment, and the remaining are used at student discretion. Besides illustrations and film loop notes for explanation use, a reprinted article concerning collateral reading is included. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 895 SE 015 532
Project Physics Text 3, The Triumph of Mechanics.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—169p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—*Energy, Instructional Materials, Kinetic Molecular Theory, *Physics, Scientific Concepts, Secondary Grades, *Secondary School Science, *Textbooks, *Thermodynamics
Identifiers—Harvard Project Physics

Mechanical theories are presented in this unit of the Project Physics text for senior high students. Collisions, Newton's laws, isolated systems, and Leibniz' concept are discussed, leading to conservation of mass and momentum. Energy conservation is analyzed in terms of mechanical energy, heat energy, steam engines, Watt's engine, Joule's experiment, and energy in biological systems. Kinetic theory of gases is studied in connection with molecular sizes and speeds, ideal gas, second thermodynamic law, statistical representations, time's arrow, and recurrence paradox. Wave models are introduced to deal with the superposition principle, sound properties, and wave interference, diffraction, reflection, and refraction. Historical developments are stressed in the description of this unit. Included is a chart of renowned people's life spans from 1700 to 1850. Besides illustrations for explanation use, problems with their answers are also provided in two categories: study guide and end of section questions. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 896 SE 015 533
Project Physics Teacher Guide 3, The Triumph of Mechanics.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—358p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$13.16
Descriptors—Energy, *Instructional Materials, Kinetic Molecular Theory, Multimedia Instruction, *Physics, Secondary Grades, *Secondary School Science, *Teaching Guides, Teaching Procedures, *Thermodynamics
Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 3 are presented to help teachers make effective use of learning materials. Unit contents are discussed in connection with teaching aid perspective, multi-media schedules, schedule blocks, and resource charts. Brief analyses are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, demonstration procedures, apparatus operations, notes on the student handbook, and explanation of film loops. Stroboscopic photographs are analyzed along with related film loops. Additional background articles are included to deal with physics aspects at the beginning of the 19th Century, conservation laws, elastic and inelastic collisions, energy reference levels, temperatures of outer space, feedback, atmospheric pressure determination, and photographing of standing waves. Solutions to the study guide in the text are provided, and answers to test items are suggested. The third unit of the text, along with marginal notes on each section, is also compiled in the teacher guide. The work of Harvard Project Physics has been financially supported by the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 897 SE 015 534
roject Physics Reader 4, Light and Electromagnetism.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 67
Contract—OEC-5-10-058
Note—254p.; Preliminary Version
EDRS Price MF-$0.65 HC-$9.87
Descriptors—Electricity, *Instructional Materials, Light, Magnets, *Physics, Radiation, *Science Materials, Secondary Grades, *Secondary School Science, *Supplementary Reading Materials
Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 4, a collection of articles is presented in this reader for student browsing. The 21 articles are included under the following headings: Letter from Thomas Jefferson, On the Method of Theoretical Physics; Systems, Feedback, Cybernetics; Velocity of Light; Popular Applications of Polarized Light; Eye and Camera; The laser—What it is and Does; A Simple Electric Circuit: Ohm's Law; The Electronic Revolution; The Invention of the Electric Light; High Fidelity; The Future of Direct Current Power Transmission; James Clerk Maxwell, Part II; On the Induction of Electric Currents; The Relationship of Electricity and Magnetism; The Electromagnetic Field; Radiation Belts Around the Earth; A Mirror for the Brain; Scientific Imagination; Lenses and Optical Instruments, and "Baffled!." Illustrations for explanation use are included. The work of Harvard Project Physics has been financially supported by the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 898 SE 015 535
Project Physics Tests 4, Light and Electromagnetism.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—24p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Achievement Tests, *Electricity, Instructional Materials, *Light, Magnets, Multiple Choice Tests, Physics, Secondary Grades, *Secondary School Science, *Tests
Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 4 are presented in this booklet. Included are 70 multiple-choice and 22 problem-and-essay questions. Concepts of light and electromagnetism are examined on charges, reflection, electrostatic forces, electric potential, speed of light, electromagnetic waves and radiations, Oersted's and Faraday's work, power, transformer, electromagnetic induction, Hertz's experiment, wave interference, light polarization, Michelson and Morley experiment, Newton's theory of colors, Van Allen belts, and relativity. Suggestions are made for time consumption in answering some items. Besides directions and illustrations for explanation use, related physical equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 899 SE 015 536
Project Physics Handbook 4, Light and Electromagnetism.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—63p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Electricity, Instructional Materials, Laboratory Experiments, *Laboratory Manuals, Light, *Physics, *Science Activities, *Science Experiments, Secondary Grades, *Secondary School Science
Identifiers—Harvard Project Physics

Seven experiments and 40 activities are presented in this handbook. The experiments are related to Young's experiment, electric forces, forces on currents, electron-beam tubes, and wave modulation and communication. The activities are primarily concerned with aspects of scattered and polarized light, colors, image formation, lenses, cameras, refraction, gratings, speed of light, electric fields, batteries, magnets, perpetual motion machines, electron tubes, Faraday disc dynamo, generators, motors, and Bell telephone science kits. Demonstrations, construction projects, and self-directed instructions are stressed in these activities. The four chapters in the handbook are designed to correspond to the text materials, with complete instructions in each experiment. Some experiments are suggested for assignment, and the remaining are used at student discretion. Illustrations and film loop notes for explanation use are included. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 900 SE 015 537
Project Physics Text 4, Light and Electromagnetism.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—154p., Authorized Interim Version
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Course Content, *Electricity, Instructional Materials, Magnets, *Optics, *Physics, Scientific Concepts, Secondary Grades, *Secondary School Science, *Textbooks
Identifiers—Harvard Project Physics

Optical and electromagnetic fundamentals are presented in this fourth unit of the Project Physics text for use by senior high students. Development of the wave theory in the first half of the 19th Century is described to deal with optical problems at the early stage. Following explanations of electric charges and forces, field concepts are introduced in connection with electrons, currents, potential differences, Oersted's discovery, Ampere's work, and moving charges in magnetic fields. Faraday's lines of force are used to analyze electromagnetic induction and its applications as well as modern civilization under the influence of scientific discoveries. Further discussions of field theories are made for electromagnetic radiation, taking into account Maxwell's theories, Hertz's experiment, wave propagation, electromagnetic spectra, and ether concept. Historical developments are stressed in the overall explanation. Problems with their answers are provided in two categories: study guide and end of section questions. Also included are related illustrations for explanation purposes and a chart of renowned people's life spans between 1700 and 1900. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 901 SE 015 538
Project Physics Teacher Guide 4, Light and Electromagnetism.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—277p.; Authorized Interim Version
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Electricity, Instructional Materials, Multimedia Instruction, *Optics, *Physics, Science Activities, Secondary Grades, *Secondary School Science, *Teaching Guides, Teaching Procedures
Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 4 are presented to help teachers make effective use of learning materials. Unit contents are discussed in connection with teaching aid lists, multi-media schedules, schedule blocks, and resources charts. Brief summaries are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, procedures used in demonstrations, apparatus operations, notes on the student handbook, and explanation of film loops. Additional articles are concerned with electromagnetic spectra, field concepts, Oersted's own account of his discovery, Romer's work, and "lectron" series. Current balances and microwave apparatus are analyzed, and a bibliography of references including that of photographic instrumentation is given. Solutions to study guides are provided in detail, and answers to test items are suggested. The fourth unit of the text, along with marginal comments on each section, is also compiled in the manual. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 902 SE 015 539
Project Physics Reader 5, Models of the Atom.
Harvard Univ., Cambridge, Mass. Harvard Project Physics.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-5-1038
Pub Date 68
Contract—OEC-5-10-058
Note—272p., Authorized Interim Version
EDRS Price MF-$0.65 HC-$9.87
Descriptors—*Atomic Theory, Instructional Materials, *Physics, Quantum Mechanics, Reading Materials, Relativity, Science Materials, Secondary Grades, *Secondary School Science, *Supplementary Reading Materials

Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 5, a collection of articles is presented in this reader for student browsing. Nine excerpts are given under the following headings: failure and success, Einstein, Mr. Tompkins and simultaneity, parable of the surveyors, outside and inside the elevator, the teacher and the Bohr theory of atom, Dirac and Born, the sea-captain's box, and looking for a new law. Six book passages are selected from related publications to deal with aspects of Thomson's model, mathematical representation of relativity, introductory quantum mechanics, Schrodinger's work, moon explorers' discoveries concerned with the island of research, relativity, possibility of inadequacies in education policies, evolution of physicist's picture of nature, fundamentals of wave mechanics, and physical and engineering problems in space travel. Illustrations are included for explanation purposes. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 903 SE 015 540

Project Physics Tests 5, Models of the Atom.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—32p.; Preliminary Version

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Achievement Tests, *Atomic Theory, Instructional Materials, Multiple Choice Tests, *Physics, Quantum Mechanics, Relativity, Secondary Grades, *Secondary School Science, *Testing

Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 5 are presented in this booklet. Included are 70 multiple-choice and 23 problem-and-essay questions. Concepts of atomic model are examined on aspects of relativistic corrections, electron emission, photoelectric effects, Compton effect, quantum theories, electrolysis experiments, atomic number and mass, particle scattering, charge-to-mass ratio, de Broglie wavelength, Balmer formula, Heisenberg's uncertainty principle, spectroscopic analysis, x-radiation, photons, Millikan oil-drop experiment, and atomic transition. Suggestions are made for time consumption in answering some items. Besides directions and a few illustrations for explanation purposes, related physical constants, definition, and equations are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 904 SE 015 541

Project Physics Handbook 5, Models of the Atom.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—42p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Atomic Theory, Instructional Materials, Laboratory Experiments, *Laboratory Manuals, Physics, *Physics Experiments, *Science Activities, Secondary Grades, *Secondary School Science

Identifiers—Harvard Project Physics

Five experiments and 19 activities are presented in this Unit 5 handbook. The experiments are related to electrolysis, charge-to-mass ratio, elementary charge determination, photoelectric effects, and spectroscopic analyses. The activities are concerned with Dalton's theory, water electrolysis, periodic tables, single-electron plating, cloud chambers, accelerators, counters, spectrographs, Einstein's work, cathode rays, x-rays, ionization, differences in atomic models, Rutherford atom, and de Broglie waves. A reprinted chemi-crostic and a specially designed cigar box atom are also incorporated in the activities. Moreover, three film loops are introduced in terms of production of sodium electrolysis, Thomson's atomic model, and Rutherford scattering. Demonstrations, construction projects, and self-directed instructions are stressed in the activities. The four chapters in the handbook are designed to correspond to the text, with complete instructions in each experiment. Some experiments and activities are suggested for assignment, and the remaining are used at student discretion. Illustrations are provided for explanation purposes. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 905 SE 015 542

Project Physics Text 5, Models of the Atom.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—145p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Atomic Structure, *Atomic Theory, Instructional Materials, *Physics, Quantum Mechanics, Relativity, *Scientific Concepts, Secondary Grades, *Secondary School Science, *Textbooks

Identifiers—Harvard Project Physics

Basic atomic theories are presented in this fifth unit of the Project Physics text for use by senior high students. Chemical basis of atomic models in the early years of the 18th Century is discussed n connection with Dalton's theory, atomic properties, and periodic tables. The discovery of electrons is described by using cathode rays, Millikan's experiment, photoelectric effects, x-rays, and Einstein's photon model. Analyses of nucleus are made with a background of gas spectra, Rutherford's model, nuclear charges and sizes, Bohr theory, Franck-Hertz experiment, periodicity of elements, and atomic theory in the early 1920's. Latest ideas about atomic theory are given in terms of results of relativity concepts, particle-like behavior in radiation, wave-like behavior of matter, uncertainty principle, probability interpretation, and physical ideas of quantum mechanics. Historical developments are stressed in the overall explanation. Problems with answers are provided in two categories: study guide and end of section questions. Also included are related illustrations for explanation use and a chart of renowned people's life spans from 1800 to 1950. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 906 SE 015 543

Project Physics Teacher Guide 5, Models of the Atom.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—257p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$9.87

Descriptors—*Atomic Theory, Instructional Materials, *Multimedia Instruction, *Physics, Science Activities, Secondary Grades, *Secondary School Science, *Teaching Guides, Teaching Procedures

Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 5 are presented to help teachers make effective use of learning materials. Unit contents are discussed in connection with teaching aid lists, multi-media schedules, schedule blocks, and resource charts. Brief summaries are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, procedures used in demonstrations, apparatus operations, notes on the student handbook, and an explanation of film loops. Additional articles are concerned with relative atomic mass determination, spectroscopic experimentation, Rutherford scattering, angular momentum, and Nagaoka's theory of the "Saturnian" atom. A phototube unit and a Millikan setup are analyzed, and a bibliography of reference texts and periodicals is given. Solutions to the study guide are provided in detail, and answers to test items are suggested. The fifth unit of the text, with marginal notes on each section, is also compiled in the manual. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 907 SE 015 544

Project Physics Reader 6, The Nucleus.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—248p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$9.87

Descriptors—Instructional Materials, *Nuclear Physics, Physics, *Radiation, Reading Materials, Science Materials, Secondary Grades, *Secondary School Science, *Supplementary Reading Materials

Identifiers—Harvard Project Physics

As a supplement to Project Physics Unit 6, a collection of articles is presented in this reader for student browsing. Five excerpts are concerned with the nuclear energy revolution, the 20th birthday and possible consequences of the atomic age, a scientist's view of science, and relations between mathematics and physics. Six book passages are related to Rutherford's work, Mr. Tompkins' learning of elementary particles, power from the stars, the first chain reaction, conservation laws, and the fall of parity. The remaining are given under the following headings: The Nature of the Alpha Particle, Some Personal Notes on the Search for the Neutron, Antiprotons, The Tracks of Nuclear Particles, The Spark Chamber, The Evolution of the Cyclotron, "The Cyclotron as Seen By . . ." CERN (Conseil Europeen pour la Recherche Nucleaire), Models of the Nucleus, "Can Time Go Backward?," A Report to the Secretary of War, Tasks for a World Without War, and The Development of the Space-Time View of Quantum Electrodynamics. Illustrations for explanation purposes are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 908 SE 015 545

Project Physics Tests 6, The Nucleus.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—25p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Achievement Tests, Instructional Materials, Multiple Choice Tests, *Nuclear Physics, Physics, *Radiation, Radioisotopes, Secondary Grades, *Secondary School Science, *Testing

Identifiers—Harvard Project Physics

Test items relating to Project Physics Unit 6 are presented in this booklet. Included are 70 multiple-choice and 24 problem-and-essay questions. Nuclear physics fundamentals are examined with respect to the shell model, isotopes, neutrons, protons, nuclides, charge-to-mass ratios, alpha particles, Becquerel's discovery, gamma rays, cyclotrons, nuclear fusion processes, radioactive atoms, decay processes, nuclear binding energies, beta-particle emissions, reactor moderators, half-lives, accelerators, isotopic tracers, transuranium elements, radioactive fallout, and plasmas. Suggestions are made for time consumption in answering some items. Directions and illustrations for explanation purposes are provided. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 909 SE 015 546

Project Physics Handbook 6, The Nucleus.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—34p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Instructional Materials, Laboratory Experiments, *Laboratory Manuals, *Nuclear Physics, Physics, *Physics Experiments, *Science Activities, Science Experiments, Secondary Grades, *Secondary School Science

Identifiers—Harvard Project Physics

Five experiments and nine activities are presented in this Unit 6 handbook. The experiments are related to random events, ranges of alpha and beta particles, half-lives, and radioactive tracers. The activities are concerned with the energy measurement in beta radiation, demonstration with sugar cubes, ionization by radioactivity, magnetic deflection of beta rays, exponential decay in concentrations, neutron detection problem analogue, chain reaction model, nuclear fission and fusion, and peaceful use of radioactivity. Self-directed instructions, demonstrations, and construction projects are stressed in these activities. The three chapters in the handbook are designed to correspond to three of the four chapters in the text. Notes on the film loop relating to collisions with an unknown object are provided. Also given are illustrations for explanation purposes. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 910 SE 015 547

Project Physics Text 6, The Nucleus.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—128p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Instructional Materials, *Nuclear Physics, Physics, *Radiation, Radiation Effects, Radioisotopes, *Scientific Concepts, Secondary Grades, *Secondary School Science, *Textbooks

Identifiers—Harvard Project Physics

Nuclear physics fundamentals are presented in this sixth unit of the Project Physics text for use by senior high students. Included are discussions of radioactivity, taking into account Bacquerel's discovery, radioactive elements, properties of radiations, radioactive transformations, decay series, and half-lives. Isotopes are analyzed in connection with positive rays, mass spectrographs, notations for nuclides and nuclear reactions, relative abundances, and atomic masses. Nuclear structures and reactions are studied by using proton-electron and proton-neutron hypotheses with a background of discoveries of neutrons, neutrinos as well as artificial transmutation and artificially induced radioactivity. Information about binding energy, mass-energy balance, nuclear fission and fusion, stellar nuclear reactions, nuclear force and model, and biological and medical application of radioisotopes is given to conclude the whole text. Historical developments are stressed in the overall explanation. Problems with their answers are provided in two categories: study guide and end of section questions. Besides illustrations for explanation use, charts of elementary particles and physical constants with conversion factors are also included in this text unit as appendices. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 911 SE 015 548

Project Physics Teacher Guide 6, The Nucleus.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.

Bureau No—BR-5-1038

Pub Date 68

Contract—OEC-5-10-058

Note—235p.; Authorized Interim Version

EDRS Price MF-$0.65 HC-$9.87

Descriptors—Instructional Materials, *Multimedia Instruction, *Nuclear Physics, Physics, *Radiation, Science Activities, Secondary Grades, *Secondary School Science, *Teaching Guides, Teaching Procedures

Identifiers—Harvard Project Physics

Teaching procedures of Project Physics Unit 6 are presented to help teachers make effective use of learning materials. Unit contents are discussed in connection with teaching aid lists, multi-media schedules, schedule blocks, and resource charts. Brief summaries are made for transparencies, 16mm films, and reader articles. Included is information about the background and development of each unit chapter, procedures in demonstrations, apparatus operations, notes on the student handbook, and an explanation of film loops. Additional articles are concerned with objects dated by radiocarbon, radiation safety, properties of radiations, radioactive sources, radioactivity determination by electroscopes, and radiation detecting devices. Scalers, counters, Geiger tubes, and cadmium selenide photocells are analyzed; and a bibliography of references is given. Solutions to the study guide are provided in detail, and answers to test items are suggested. The sixth unit of the text, with marginal comments on each section, is also compiled in the manual. The work of Harvard Project Physics has been financially supported by: the Carnegie Corporation of New York, the Ford Foundation, the National Science Foundation, the Alfred P. Sloan Foundation, the United States Office of Education, and Harvard University. (CC)

ED 071 912 SE 015 549

Project Physics Programmed Instruction, Vectors 1.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Bureau No—BR-5-1038

Pub Date 68

Note—56p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Individualized Instruction, *Instructional Materials, Mathematical Applications, Mathematics, *Physics, *Programed Instruction, Science Education, *Secondary School Science

Identifiers—Harvard Project Physics, *Vectors

This programmed instruction booklet is an interim version of instructional materials being developed by Harvard Project Physics. It is the first in a series of three booklets on vectors and covers the definitions of vectors and scalars, drawing vector quantities to scale, and negative vectors. For others in this series, see SE 015 550 and SE 015 551. (DT)

ED 071 913 SE 015 550

Project Physics Programmed Instruction, Vectors 2.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Bureau No—BR-5-1038

Pub Date 68

Note—62p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Individualized Instruction, *Instructional Materials, Mathematical Applications, Mathematics, *Physics, *Programed Instruction, Science Education, *Secondary School Science

Identifiers—Harvard Project Physics, *Vectors

This is the second of a series of three programmed instruction booklets on vectors developed by Harvard Project Physics. It covers adding two or more vectors together, and finding a third vector that could be added to two given vectors to make a sum of zero. For other booklets in this series, see SE 015 549 and SE 015 551. (DT)

ED 071 914 SE 015 551

Project Physics Programmed Instruction, Vectors 3.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Bureau No—BR-5-1038

Pub Date 68

Note—38p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Individualized Instruction, *Instructional Materials, Mathematical Applications, Mathematics, *Physics, *Programed Instruction, Science Education, *Secondary School Science

Identifiers—Harvard Project Physics, *Vectors

This is the third of a series of three programmed instruction booklets on vectors developed by Harvard Project Physics. Separating vectors into components and obtaining a vector from its components are the topics covered. For other booklets in this series, see SE 015 549 and SE 015 550. (DT)

ED 071 915 SE 015 552

Project Physics Programmed Instruction, Waves 1.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Bureau No—BR-5-1038

Pub Date 68

Note—47p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Individualized Instruction, *Instructional Materials, *Physics, *Programed Instruction, Science Education, *Secondary School Science

Identifiers—Harvard Project Physics, *Waves

This programmed instruction booklet is an interim version of instructional materials being developed by Harvard Project Physics. It is the first of two booklets on the topic of waves and covers pulses, how pulses travel, and what happens when two pulses pass through the same region at the same time. For the second booklet in this series, see SE 015 553. (DT)

ED 071 916 SE 015 553

Project Physics Programmed Instruction, Waves 2.

Harvard Univ., Cambridge, Mass. Harvard Project Physics.

Bureau No—BR-5-1038

Pub Date 68

Note—46p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Individualized Instruction, *Instructional Materials, *Physics, *Programed Instruction, Science Education, *Secondary School Science

Identifiers—Harvard Project Physics, *Waves

This is the second of two programmed instruction booklets on the topic of waves, developed by Harvard Project Physics. It covers the relationships among the frequency, period, wavelength, and speed of a periodic wave. For the first booklet in this series, see SE 015 552. (DT)

ED 075 441 SP 007 338

Physical Science-Supplement: Project Oriented.

Nederland Independent School District, Tex.

Pub Date Jun 70

Note—58p.

Available from—Curriculum Office, P.O. Box 908, Nederland, Texas 77627 ($3.00)

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—*Curriculum Guides, Low Ability Students, *Physical Sciences, *Slow Learners

GRADES OR AGES: No mention, appears to be for secondary grades. SUBJECT MATTER: Physical sciences for slow learners. ORGANIZATION AND PHYSICAL APPEARANCE: The guide is divided into 11 units, each of which is further subdivided into several chapters. Each chapter is laid out in three columns; column headings are concepts, content, and activities. The guide is mimeographed and spiral-bound with a paper cover. OBJECTIVES AND ACTIVITIES: No specific objectives are mentioned. Each activity or group of activities in a chapter is related to a specific concept. Most activities consist of simple laboratory experiments to be demonstrated by the teacher. A few of the experiments are to be done by students with the aid of the teacher. Textbook assignments are coordinated with specific demonstrations. INSTRUCTIONAL MATERIALS: Very few materials are listed, other than those needed for laboratory demonstrations. These are listed with each experiment. Some chapters coordinate films with other activities. STUDENT ASSESSMENT: No mention. (RT)

ED 079 026 SE 014 886

Sanderson, Robert C.

Dynamics II, Science (Experimental): 5318.03.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—19p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Behavioral Objectives, Instruction, Instructional Materials, Objectives, *Physics, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction was designed as a laboratory-oriented course, to relate the causes of motion of masses which are moving in other than a straight line. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, field trips, speakers or resource people, and topics for student projects, reports, and additional innovative activities. Also listed are relevant films, film loops, and transparencies available from the Dade County Audiovisual Center. Reference books, laboratory guides, and sources of discussion questions and solved problems are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 027 SE 014 887

Castaldi, June P.

Energy: Light, Sound, and Heat, Science (Experimental): 5311.04.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—19p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3,29

Descriptors—*Behavioral Objectives, Energy, Instruction, Instructional Materials, Physics, Resource Materials, *Secondary School Science, *Teaching Guides

Identifiers—*Quinmester Program

This unit of instruction was designed as a basic course involving the study of light, sound, and heat at the junior high school level. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, field trips, and topics for student projects, reports, discussions, and other activities. Also listed are related mathematics problems, and relevant films available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 079 028 SE 014 888

Castaldi, June P.

Energy: Machines, Science (Experimental): 5311.03.

Dade County Public Schools, Miami, Fla.

Pub Date 71

Note—20p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Behavioral Objectives, Energy, Instruction, Instructional Materials, *Physics, Resource Materials, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction was designed as an introductory course in energy involving six simple machines, electricity, magnetism, and motion. The booklet lists the relevant state-adopted texts and states the performance objectives for the unit. It provides an outline of the course content and suggests experiments, demonstrations, field trips, and topics for student projects, reports, and discussions. Also listed are related mathematics problems, and relevant films available from the Dade County Audiovisual Center. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (JR)

ED 080 476 SP 006 753

Harris, Dorothy V., Ed.

DGWS Research Reports: Women in Sports.

American Association for Health, Physical Education, and Recreation, Washington, D.C. Div. for Girls and Women's Sports.

Pub Date 71

Note—110p

Available from—American Association for Health, Physical Education, and Recreation, 1201 Sixteenth St., N.W., Washington, D.C. 20036 ($3.00)

EDRS Price MF-$0.65 HC Not Available from EDRS.

Descriptors—Athletic Activities, Athletics, *Exercise (Physiology), *Physical Activities, *Psychological Studies, *Research, Social Attitudes, *Social Factors

A series of research reports on three aspects of womens sports: the psychosocial, the physiological, and teaching and coaching are presented. Section 1 (psychosocial) mentions such aspects as societal attitudes toward women in sports, sex differences and research, and women and competition. Section 2 (physiological) considers such aspects as work capacity, effects on growth, selection of sports, pain and athletics, and the effects of the menstrual cycle on physical activity. The section on the aspects of teaching and coaching discusses such topics as teaching methods, research in learning sports, and research relating practice methods to retention. (JB)

ED 086 477 SE 016 423

Williams, G. J.

Learning Activity Package, Physical Science. LAP Numbers 5, 6, and 7.

Ninety Six High School, S. C.

Pub Date 72

Note—67p

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Behavioral Objectives, *Curriculum, *Individualized Instruction, *Instructional Materials, *Physical Sciences, Science Education, Secondary School Science, *Study Guides, Teacher Developed Materials, Units of Study (Subject Fields)

These three units of the Learning Activity Packages (LAPs) for individualized instruction in physical science cover the physical and chemical properties of water, dehydration of crystals, solutions, acidity, strong and weak bases, neutral properties of salts, amorphous forms of carbon, hydrocarbons, and petroleum products. Each unit contains a rationale for the material; a list of behavioral objectives for the unit; a list of resources including texts, reading assignments, specified problems, handouts, tape recordings, and science activities and experiments; a problem set for student self-evaluation; suggestions for advanced study; and references. Related physical science LAPs are SE 016 422 and SE 016 424. (CC)

ED 086 478 SE 016 424

Williams, G. J.

Learning Activity Package, Physical Science. LAP Numbers 8, 9, 10, and 11.

Ninety Six High School, S. C.

Pub Date 72

Note—92p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Behavioral Objectives, *Curriculum, *Individualized Instruction, *Instructional Materials, *Physical Sciences, Science Education, Secondary School Science, *Study Guides, Teacher Developed Materials, Units of Study (Subject Fields)

These four units of the Learning Activity Packages (LAPs) for individualized instruction in physical science cover nuclear reactions, alpha and beta particles, atomic radiation, medical use of nuclear energy, fission, fusion, simple machines, Newton's laws of motion, electricity, currents, electromagnetism, Oersted's experiment, sound, light, photosynthesis, and wave motion. Each unit contains a rationale for the material, a list of resources including texts, reading assignments, handouts, tape recordings, demonstrations, and science activities; suggestions for advanced study; and a list of behavioral objectives for the unit. Related physical science LAPs are SE 016 422 and SE 016 423. (CC)

ED 086 519 SE 017 119

Petit, Ralph E.

Atomic Physics, Science (Experimental): 5318.42.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—21p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Atomic Structure, Atomic Theory, *Behavioral Objectives, Instructional Films, *Instructional Materials, *Nuclear Physics, *Physical Sciences, Physics, Science Education, Secondary School Science

Identifiers—*Quinmester Program

Presented is the study of modern and classical concepts of the atom; the structure of the atom as a mass-energy relationship; practical uses of radioactivity; isotopes; and the strange particles. Performance objectives (16) are included as well as a detailed course outline. Experiments, demonstrations, projects and reports to enhance student learning experiences are suggested. To enhance creative thinking, a list of innovative activities has been compiled and presented. Available films, film loops and transparencies are included in the course of instruction. Additional instructional aids include: (1) suggested discussion questions; (2) references; (3) laboratory guides; and (4) a master sheet (coordinating objectives with suggested text chapters, laboratory exercises, projects, reports, etc.). (Author/EB)

ED 086 520 SE 017 120

Buffaloe, Jacquelin F.

Atoms, Molecules, and Kinetic Theory, Science (Experimental): 5317.63.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—29p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Atomic Structure, *Atomic Theory, Behavioral Objectives, Chemistry, Curriculum Guides, *Instructional Materials, Kinetic Molecular Theory, Science Education, *Secondary School Science

Identifiers—*Quinmester Program

This course of instruction in advanced chemistry is intended for the student ready for first-year college chemistry. Presented is an in-depth review with theory and mathematics being stressed in the study of concepts involving atomic structure, bonding, states of matter, molar relationships in equations, and properties of solutions. It is suggested that the course play a major role in preparing the student for the Advanced Placement Test in chemistry. Guidelines for enrollment into the course are included. Fourteen performance objectives are listed and a detailed course outline is presented. Ninety-five experiments, drawn from several different curricula, are presented as part of the student performance activities. Additional related learning experiences included in the course description are suggested projects, reports, field trips and related problems. A reference list for films, film loops, and film strips is presented as well as references for books and articles. A master sheet coordinating the entire curriculum is included. (Author/EB)

ED 086 521 SE 017 121

Buffaloe, Jacquelin F.

Energy of Atoms and Molecules, Science (Experimental): 5316.05.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—27p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Atomic Structure, Atomic Theory, *Behavioral Objectives, *Chemistry, Curriculum Guides, *Instructional Materials, *Secondary School Science

dentifiers—*Quinmester Program

This third unit in chemistry is considered for any chemistry student and particularly the college-bound student. An understanding of the material included should enable the student to understand better the concepts in the Dynamic Nature of Atoms and Molecules which are essential for Organic Chemistry, the Chemistry of Carbon and Its Compounds and Qualitative Analysis. The student explores energy changes, solubility of chemicals, and chemical reactions by use of laboratory investigations and problem solving situations. The purpose of doing calculations is to apply the concepts and, therefore, the arithmetic is made as simple as the type of problem will allow. Eleven performance objectives are presented in detail. The course outline includes four major topics: (1) Phases of Matter; (2) Solutions; (3) Determination of [Change in Heat] for Chemical Reaction, and (4) Rates of Reaction. The entire curriculum is presented, including experiments, demonstrations, projects and reports presented by students. Audio-visual aids, including films, film loops, and film strips are suggested. A master sheet coordinating the curriculum is presented. (Author/EB)

ED 089 043 CE 001 089

Physics I: Curriculum Guide.

Harlandale Independent School District, San Antonio, Tex. Career Education Center.

Spons Agency—Office of Education (DHEW), Washington, D.C.; Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

Pub Date [70]

Note—142p.

EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE

Descriptors—Audiovisual Aids, *Curriculum Development, *Curriculum Guides, Educational Objectives, Educational Resources, Instructional Materials, Occupational Information, *Physics, *Secondary Grades, Units of Study (Subject Fields)

Identifiers—Texas

The guide provides both subject matter and career preparation assistance for physics teachers. It is arranged in vertical columns relating curriculum concepts in physics to curriculum performance objectives, career concepts and career performance objectives, suggested teaching methods, and resource materials. Career information is included on 46 physics-related occupations. Space is provided for teacher's notes which will be useful when the guide is revised. The appendix includes useful formulas, audio-visual source information, career source information, selected references, and periodicals for career information. (EA)

ED 091 176 SE 017 622

Jindra, Paul E

Theory of Electricity and Magnetism, Science (Experimental): 5318.06.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—16p., An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Curriculum Guides, *Electricity, *Individualized Instruction, *Magnets, Physics, Science Education, *Secondary School Science, Study Guides

Identifiers—*Quinmester Program

This unit of instruction presents an individualized mini-course in electricity and magnetism. The course is geared for college-preparatory high school students. A textbook and film bibliography, performance objectives, suggested conditions for completing objectives, a course outline, laboratory activities and suggested resources for he teacher are contained in this module. (JMP)

ED 093 622 SE 017 130

Sanderson, Robert C.

Geometric and Applied Optics, Science (Experimental): 5318.04.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—27p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Instruction, *Instructional Materials, Light, *Optics, *Physical Sciences, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction presents a laboratory-oriented course which relates the sources and behaviors of light to man's control and uses of light. Successful completion of Algebra I and Plane Geometry is strongly recommended as indicators of success. The course is recommended if the student plans further studies in science, optical technology, or medicine. It is not recommended for physics or engineering majors. The booklet provides performance objectives and lists the relevant state-adopted texts. It provides a course outline and suggests experiments, projects, reports, field trips, speakers or resource people, discussion questions, and innovative activities. Also listed are relevant films available from the Dade County Audiovisual Center. Transparencies are also listed. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 093 656 SE 017 614

Plotts, Paul L.

Energy and Work, Science (Experimental): 5348.05.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—16p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—*Energy, Instruction, *Instructional Materials, Physical Sciences, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction introduces the measuring of work, power, and energy; forms of energy; conversion and conservation of energy; and types of machines. It is a course suggested for the terminal science student. No requisites for prior course work are suggested. The booklet lists the state-adopted texts in the list of references. It states the performance objectives and the course outline. Experiments, demonstrations, projects, and problems are found in the booklet. Relevant films available from the Dade County Audiovisual Center are listed, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 093 658 SE 017 618

Petit, Ralph E.

Light Theory, Science (Experimental): 5318.05.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—28p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Instruction, *Instructional Materials, Light, *Physics, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction deals with building models of light with emphasis on the particle theory, the wave theory, and the theory of possible duality. Successful completion of Algebra I and Plane Geometry is strongly recommended as indicators of success. The booklet lists the relevant state-adopted texts and provides a list of the performance objectives. It provides the course outline and experiments, demonstrations, projects, reports, field trips, innovative activities and related solved problems. Also listed are films available from the Dade County Audiovisual Center. Film loops and relevant transparencies are listed, as well as suggested discussion questions. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 093 659 SE 017 620

Ries, Wesley G.

Modern Physics, Science (Experimental): 5318.07.

Dade County Public Schools, Miami, Fla.

Pub Date 72

Note—23p.; An Authorized Course of Instruction for the Quinmester Program

EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE

Descriptors—Instruction, *Instructional Materials, *Nuclear Physics, *Physics, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

Identifiers—*Quinmester Program

This unit of instruction is a survey course exploring the areas of nuclear physics, physics of modern discoveries, and their effects on the world of today. No requisites for prior course work, experience, or courses to be taken concurrently are required for enrollment. The booklet lists the relevant state-adopted texts and states the performance objectives desired. The course outline is included along with experiments and/or demonstrations, activities, and problems. Resource people are suggested, and a list of films available from the Dade County Audiovisual Center is provided. Other materials, such as transparencies and film loops, are also listed. Reference books are recommended, and a master sheet is provided relating each suggested activity to the specific performance objectives. (EB)

ED 095 017 SE 018 096

Lunetta, Vincent N.

Newton's Law: A Computer-Based Simulation for Introductory Physics. Technical Report No. 1.

Iowa Univ., Iowa City. Science Education Center.

Report No—TR-1

Pub Date Jul 74

Note—128p.; Some pages may reproduce poorly due to quality of original document

EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE

Descriptors—*Computer Assisted Instruction, Curriculum, *Educational Research, Individualized Instruction, Instruction, Learning Activities, *Physics, Science Education, *Secondary School Science, *Simulation

Identifiers—Newton (Isaac)

This report describes four individualized programs which simulate physical experiments in force and motion, graph and data collected by individual students, and provide feedback to each student relative to his generalizations. An overview of the unit is provided, descriptions of the unit and accessory materials are presented, sample runs of the four programs are included, and instructional objectives are listed. Instructions given the students concerning procedures for running the programs, instructions for the teachers in regard to use of the programs, and evaluation instruments are included. One section of the report describes a study which evaluated the classroom use of these computer-based simulation programs. Finally, the program and file listings for each of the four programs, and non-computer simulation problem sheets are provided. (DT)

ED 095 029 SE 018 187

Holland, Bill

Learning Activity Package, Physics 124, (LAP) Studies 45, 47, and 48.

Ninety Six High School, S. C.

Pub Date [74]

Note—38p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Autoinstructional Programs, *Energy, *Individualized Instruction, Instructional Materials, *Measurement, Physics, Science Education, *Secondary School Science, Self Help Programs, *Time

Identifiers—LAP, Learning Activity Package

Included are three Learning Activity Packages (LAP) studies for use in high school physics instruction: Time and Measurement Function; Force, Work, and Momentum, and Momentum, Work, and Energy. Each LAP contains a rationale for teaching the material included, student objectives (stated in behavioral terms), a list of resources (readings, problems, laboratory activities, audiovisual aids), a student self-evaluation, and suggestions for advanced study. (PEB)

ED 096 119 **SE 018 019**
Brubaker, R. C.
Calibrating a Thermometer.
Delaware State Dept. of Public Instruction Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—[illegible]F-GW-6703
Pub Date 30 [illegible] 73
Note—7p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Instruction, *Instructional Materials, *Physical Sciences, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System, Thermometers

This autoinstructional program deals with the use of thermometers as related to the physical sciences. It is suggested for use in Middle School science programs. A student is required to have a knowledge of the metric system and be familiar with Fahrenheit, Celsius and Kelvin scales. Behavioral objectives are included as well as equipment needed, time allotment (50 minutes), and reference to "Interaction of Matter and Energy," Rand McNally - 1968 as cited bibliographical data. Instructions are presented with a question sheet to be completed by the student. (EB)

ED 096 122 **SE 018 022**
Reuter, W. A.
Characteristics of Transverse and Longitudinal Waves.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date [73]
Note—19p.
EDRS Price MF-$6.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, Instruction, *Instructional Materials, *Physics, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This monograph presents an autoinstructional program in the physical sciences. It is considered useful at the higher, middle and lower high school levels. Three behavioral objectives are listed and a time allotment of 35-40 minutes is suggested. A bibliography is included. A script, incorporating the use of a cassette player and slides, is used by the student when attempting the six experiments in the packet. Student objectives, a set of review questions and a vocabulary sheet are part of the instructional packet. (EB)

ED 096 126 **SE 018 027**
Metric System.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date 30 Jun 73
Note—8p.
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Programs, *General Science, *Measurement, Metric System, *Middle Schools, Science Education, *Secondary School Science, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Del Mod System

This autoinstructional unit deals with the identification of units of measure in the metric system and the construction of relevant conversion tables. Students in middle school or in grade ten, taking a General Science course, can handle this learning activity. It is recommended that high, middle or low level achievers can use the program. Eighteen minutes is the suggested time needed. Three behavioral objectives are given and the equipment and materials needed to help the students achieve the objectives are listed. A student guide and a vocabulary list are also included in the packet. (EB)

ED 096 549 **CE 002 190**
Gerald, John
A Self-Instructional Program in Graphical Kinematics.
Lincoln Land Community Coll., Springfield, Ill. Div. of Mathematics, Sciences, and Technologies.
Pub Date Jul 72
Note—51p.; For related document see CE 002 187
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Autoinstructional Aids, Force, *Mechanics (Physics), Mechanics (Process), *Motion, Programed Materials, *Programed Texts, Textbooks
Identifiers—*Graphical Kinematics, Peaucellier's Mechanism

The self-instructional booklet is designed to teach basic concepts of graphical kinematics if a step-by-step procedure is followed through the various frames. Each frame is composed of three main parts: (1) a statement of information, (2) a problem to be solved or a statement to be answered, and (3) the correct response. The answer sheet form and a posttest are appended. (Author/AJ)

ED 097 195 **SE 017 318**
Physics Handbook: Activities for a Modern Program in Physics.
New York State Education Dept., Albany. Bureau of Secondary Curriculum Development.
Pub Date 70
Note—193p.
EDRS Price MF-$0.75 HC-$9.00 PLUS POSTAGE
Descriptors—*Instructional Materials, Laboratory Experiments, *Physics, *Science Activities, Science Education, *Secondary School Science, *Teaching Guides, Units of Study (Subject Fields)

This handbook contains information that has been used in the high school laboratory by many teachers. Most of the experiments can be adapted for use as individual laboratory exercises or as teacher-student demonstrations. The resource material in this handbook should be helpful to all physics teachers as they continue to adapt their courses to satisfy the ever-expanding concepts and processes of physics. Four areas are included in this manual: (1) Kinematics, (2) Waves, (3) Electricity, and (4) Radiation Phenomena. An index to learning activities is included in the handbook and the appendix presents a list of suggested and necessary apparatus and supplies required to carry out the activities of the handbook. (EB)

ED 098 066 **SE 018 195**
Williams, G. J.
Learning Activity Package, Physical Science 92, LAPs 1-9.
Ninety Six High School, S. C.
Pub Date [73]
Note—210p.; Related documents are ED 086 476-478
EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE
Descriptors—Behavioral Objectives, *Curriculum, Individualized Instruction, *Instructional Materials, *Physical Sciences, Science Education, *Secondary School Science, *Study Guides, Teacher Developed Materials, Units of Study (Subject Fields)
Identifiers—*Learning Activity Package

This set of nine teacher-prepared Learning Activity Packages (LAPs) for individualized instruction in physical science covers the topics of scientific equipment and procedures; measure of time, length, area, and volume; water; oxygen and oxidation; atmospheric pressure; motion; machines; carbon; and light and sound. Each unit contains a rationale for the material; a list of behavioral objectives for the unit; a list of resources including texts, reading assignments, specified problems, handouts, tape recordings, filmstrips, demonstrations, lab experiments, and science activities; a problem set for student self-evaluation; suggestion for advanced study; and references. (DT)

ED 099 496 **CE 002 573**
Progress Check Module: Basic Electricity and Electronics Individualized Learning System. Progress Check Booklet.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVEDTRA-34258-PC
Pub Date Jan 74
Note—297p.; For other modules in the series, see CE 002 574-589. Several series of blank pages were removed from the document
EDRS Price MF-$0.75 HC-$13.80 PLUS POSTAGE
Descriptors—*Electricity, *Electronics, Individualized Instruction, Individualized Programs, Individual Tests, Military Training, Post Secondary Education, Programed Instruction, *Programed Materials, Testing, Trade and Industrial Education

The Progress Check Booklet is designed to be used by the student working in the programed course to determine if he has mastered the concepts in the course booklets on: electrical current; voltage; resistance; measuring current and voltage in series circuits; relationships of current, voltage, and resistance; parellel circuits; combination circuits and voltage dividers, induction; relationships of current, counter EMF (electromotive force), and voltage in LR (inductive resistance) circuits; transformers; capacitance; series AC (alternating current) resistive-reactive circuits; series AC, RLC (inductive-resistive-capacitive) circuits and resonance; and parallel AC resistive-reactive circuits. Each progress check lesson consists of self-tests with the accompanying answers. Correct answers to all questions indicate to the student that he is ready to proceed to the next lesson. Appended are trigonometric tables and a summary of each of the modules. (Author/BP)

ED 099 497 **CE 002 574**
Module Zero: Orientation: Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-0a
Pub Date Jan 72
Note—58p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

This orientation module for the Basic Electric/Electronics Individualized Learning System (BEEINLES) was designed to familiarize the individual with this new learning experience. The module is divided into six lessons: your rating (a brief discussion of each of the job categories); what an individualized learning system is; the BEEINLES multimedia study area and some of its new and innovative equipment (a description of the resource center, module booklets—with their summaries, narratives, programed instruction, and the slide-sound equipment); the testing program (an explanation of the three types of tests given--progress checks, module checks, and the comprehensive examination); safety education (indicates some of the major hazards encountered in the normal working conditions of the technician); and building your power supply (how to construct your own power source before you start your formal study of the basic electronics and electricity course). (Author/BP)

ED 099 498 **CE 002 575**
Module One: Electrical Current; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-1a
Pub Date Jan 72
Note—127p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The student is introduced in this module to some fundamental concepts of electricity. The module is divided into five lessons: electricity and the electron, electron movement, current flow, measurement of current, and the ammeter. Each lesson consists of an overview, a list of study resources, lesson narratives, programed materials, and lesson summaries. (Author/BP)

ED 099 499 CE 002 576
Module Two: Voltage; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-2a
Pub Date Jan 72
Note—166p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will study and learn what voltage is, how it is generated, what AC (alternating current) and DC (direct current) are and why both kinds are needed, and how to measure voltages. The module is divided into six lessons: EMF (electromotive force) from chemical action, magnetism, electromagnetic induction, AC voltage, the uses of AC and DC, and measuring voltage. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 500 CE 002 577
Module Three: Resistance; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-3a
Pub Date Jan 72
Note—116p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will learn of the opposition offered to electron flow, what this opposition does, why it is needed, and how it is used. The module is divided into four lessons: characteristics of resistance, resistors, resistor values, and ohmmeters. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 501 CE 002 578
Module Four: Measuring Current and Voltage in Series Circuits; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-4a
Pub Date Jan 72
Note—134p.; Photographs are marginally reproducible. For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The module covers the characteristics of series circuits, how to use the multimeter as an ammeter and voltmeter, and how to make current and voltage measurements in series circuits. This module is divided into three lessons: measuring current in a series circuit, voltage in a series circuit, and using the multimeter as a voltmeter. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 502 CE 002 579
Module Five: Relationships of Current, Voltage, and Resistance; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-5a
Pub Date Jan 72
Note—121p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

This module covers the relationships between current and voltage; resistance in a series circuit; how to determine the values of current, voltage, resistance, and power in resistive series circuits; the effects of source internal resistance; and an introduction to the troubleshooting of series circuits. This module is divided into five lessons: voltage, resistance, and current; the Ohm's Law Formula; power; internal resistance; and troubleshooting series circuits. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 503 CE 002 580
Module Six: Parallel Circuits; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-6a
Pub Date Jan 72
Note—107p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will learn the rules that govern the characteristics of parallel circuits; the relationships between voltage, current, resistance and power; and the results of common troubles in parallel circuits. The module is divided into four lessons: rules of voltage and current, rules for resistance and power, variational analysis, and troubleshooting parallel circuits. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 504 CE 002 581
Module Seven: Combination Circuits and Voltage Dividers; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-7a
Pub Date Jan 72
Note—101p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will learn to apply the rules previously learned for series and parallel circuits to more complex circuits called series-parallel circuits, discover the utility of a common reference when making reference to voltage values, and learn how to obtain a required voltage from a voltage divider network. The module is divided into three lessons: solving complex circuits, voltage reference, and voltage dividers. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 505 CE 002 582
Module Eight: Induction; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-8a
Pub Date Jan 72
Note—122p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The module covers in greater depth electromagnetic induction, its effects, and how it is used to advantage in electrical circuits; and the physical components, called inductors, designed to take advantage of the phenomenon of electromagnetic induction. This module is divided into four lessons: electromagnetism; inductors and flux density, inducing voltage, and inductance and induction. Each lesson consists of an overview, list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 506 CE 002 583
Module Nine: Relationships of Current, Counter EMF, and Voltage in LR Circuits; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-9a
Pub Date Jan 72
Note—134p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The student will study the ways that inductance affects voltage and current in Direct Current (DC) and Alternating Current (AC) circuits and why and how inductors cause these actions. The module is divided into six lessons: rise and decay of current and voltage, LR (inductive-resistive) time constant, using the universal TC (time constant) chart, inductive-reactance, relationships in inductive circuits, and phase relationships. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 507 CE 002 584
Module Ten: Transformers; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-10a
Pub Date Jan 72
Note—135p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The module introduces a very important electrical device, the transformer. The module is divided into six lessons: transformer construction, transformer theory and operation, turns and voltage ratios, power and current, transformer efficiency, and semiconductor rectifiers. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 508 CE 002 585
Module Eleven: Capacitance; Basic Electricity and Electronics Individualized Learning System.
Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-11a
Pub Date Jan 72
Note—187p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$9.00 PLUS POSTAGE

Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will learn about another circuit quantity, capacitance, and discover the effects of this component on circuit current, voltage, and power. The module is divided into seven lessons: the capacitor, theory of capacitance, total capacitance, RC (resistive-capacitive circuit) time constant, capacitive reactance, phase and power relationships, and capacity design considerations. Each lesson consists of an overview, list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 509 CE 002 586

Module Twelve: Series AC Resistive-Reactive Circuits; Basic Electricity and Electronics Individualized Learning System.

Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-12a
Pub Date Jan 72
Note—208p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$10.20 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The module covers series circuits which contain both resistive and reactive components and methods of solving these circuits for current, voltage, impedance, and phase angle. The module is divided into six lessons: voltage and impedance in AC (alternating current) series circuits, vector computations, rectangular and polar notation, variational analysis of series RL (resistive-inductive) circuits, frequency discrimination in RL circuits, and series RC (resistive capacitive) circuits. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 510 CE 002 587

Module Thirteen: Series AC RLC Circuits and Resonance; Basic Electricity and Electronics Individualized Learning System.

Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-13a
Pub Date Jan 72
Note—95p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will combine RL (resistive-inductance) and RC (resistive-capacitive) circuits and learn some of the phenomena which result. The module is divided into four lessons: solving RLC (resistive-inductance-capacitive) circuits, resonant frequency in series circuits, conditions of series resonance, and experiments with series resonance. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 511 CE 002 588

Module Fourteen: Parallel AC Resistive-Reactive Circuits; Basic Electricity and Electronics Individualized Learning System.

Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-14a
Pub Date Jan 72
Note—145p.; For other modules in the series, see CE 002 573-589
EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

In this module the student will learn about parallel RL (resistive-inductance), RC (resistive-capacitive), and RCL (resistive-capacitive-inductance) circuits and the conditions that exist at resonance. The module is divided into six lessons: solving for quantities in RL parallel circuits; variational analysis of RL parallel circuits; parallel RC and RCL circuits; parallel resonance; effective resistance in parallel RL circuits; and parallel resonance experiments. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 099 512 CE 002 589

Module Fifteen: Special Topics; Basic Electricity and Electronics Individualized Learning System.

Bureau of Naval Personnel, Washington, D.C.
Report No—NAVPERS-94558-15a
Pub Date Jan 72
Note—33p.; For other modules in the series, see CE 002 537-588
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Course Content, *Electricity, *Electronics, Individualized Instruction, Individualized Programs, Industrial Education, Military Training, Post Secondary Education, *Programed Instruction, *Programed Materials, Study Guides, Trade and Industrial Education, Units of Study (Subject Fields)

The final module emphasizes utilizing the information learned in modules 1-14 to analyze and evaluate the power supply constructed in Module 0. The module contains the following narrative—power supply evaluation; experiment 1—resistance analysis of the half-wave and semiconductor power supply; experiment 2—voltage analysis of the half-wave and semiconductor power supply; experiment 3—current analysis of the half-wave and semiconductor power supply; and experiment 4—waveform analysis of the half-wave and semiconductor power supply. Each lesson consists of an overview, a list of study resources, lesson narratives, programed instructional materials, and lesson summaries. (Author/BP)

ED 100 697 88 SE 018 595

Physical Science, Environmental Education Guide.

Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Public Instruction, Madison.
Pub Date [74]
Note—29p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Conservation Education, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Outdoor Education, *Physical Sciences, *Science Education, *Secondary School Science, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Instruction Curriculum Environment, *Project I C E

This physical science guide, for use at the secondary level, is one of a series of guides, K-12, that were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design, containing a series of episodes (minilessons) that emphasize a student-centered, scientific approach to gain new and deeper understandings of ecology. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or subject areas. This guide focuses on aspects such as light, sound, and nuclear energy. Most of the 12 concepts are covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 100 698 88 SE 018 596

Physics, Environmental Education Guide.

Project I-C-E, Green Bay, Wis.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Wisconsin State Dept. of Public Instruction, Madison.
Pub Date [74]
Note—45p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Conservation Education, *Environmental Education, Instructional Materials, Interdisciplinary Approach, Learning Activities, Natural Resources, Outdoor Education, *Physics, *Science Education, *Secondary School Science, *Teaching Guides
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Instruction Curriculum Environment, *Project I C E

This physics guide, for use at the senior high level, is one of a series of guides, K-12, that were developed by teachers to help introduce environmental education into the total curriculum. The guides are supplementary in design, containing a series of episodes (minilessons) that focus on student-centered activities with direct application of mathematical and physical laws to modern-day technology. The episodes are built around 12 major environmental concepts that form a framework for each grade or subject area, as well as for the entire K-12 program. Although the same concepts are used throughout the K-12 program, emphasis is placed on different aspects of each concept at different grade levels or in different subject areas. This guide focuses on aspects such as mechanics, momentum, and light. The 12 concepts are covered in one of the episodes contained in the guide. Further, each episode offers subject area integration, subject area activities, interdisciplinary activities, cognitive and affective behavioral objectives, and suggested references and resource materials useful to teachers and students. (Author/TK)

ED 106 104 SE 018 822

Woodburn, John H.

Nuclear Science Teaching Aids and Activities.

Office of Education (DHEW), Washington, D.C.
Report No—MP-1[illegible]
Pub Date May 59
Note—77p.
EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE
Descriptors—*Instructional Aids, Instructional Materials, Laboratory Experiments, *Nuclear Physics, *Science Activities, Science Education, *Science Materials, Secondary Education, Secondary School Science, *Teaching Guides

This publication is a sourcebook for science teachers. It provides guides for basic laboratory work in nuclear energy, suggesting various teacher and student demonstrations. Ideas for science clubs, science fairs, and project research seminars are presented. Problem-solving activities for both science and mathematics classes are included, as well as materials useful for social studies for training civil defense workers in the use of nuclear radiation instruments. Information is given which supplies historical data on atomic energy. An instructional unit, Protection from Radioactive Fallout, is included. A bibliography of publications embracing several aspects of the story of nuclear science and organized by grade levels is included, and a descriptive list of films is presented alphabetically by title. A chronology of steps leading to present knowledge about nuclear science is designed and presented to give teachers and students a better perspective of the whole subject of atomic energy. (EB)

ED 117 566 CE 006 283

Career Education Resource Guide for Physics. (Tentative.)

Louisiana State Dept. of Education, Baton Rouge.
Report No—Bull-1352; VT-102-462
Pub Date 74
Note—26p.; For related documents, see CE 006 282-291
EDRS Price MF-$0.83 HC-$2.06 Plus Postage
Descriptors—*Career Education, *Career Oppor-

tunities, Career Planning, Curriculum, Hobbies, *Learning Activities, Occupational Information, *Physics, *Resource Guides, Science Curriculum, Secondary Education
dentifiers—Louisiana

The career education resource guide integrates learning activities in basic physics with an exploration of careers in physics or related fields. The guide is keyed to the physics textbooks and laboratory manuals adopted by the Louisiana State Department of Education in 1973. The field of physics is divided into six subject areas: (1) the description of motion, (2) mechanics, (3) thermodynamics, (4) waves, (5) electricity and magnetism, and (6) modern physics. For each subject area, a subject guide, suggested objectives, and career exploration activities are given. The subject guide attempts to keep the curriculum material in perspective. The suggested objectives are referenced, where possible, to experiments in the laboratory manuals on the State adopted list. The career exploration activities center on careers and hobbies that are related to that particular area of physics. An introductory career activity unit precedes that six subject areas and a culminating career activity unit follows. The appendixes include a classified list of physics-related hobbies and careers. (Author/NJ)

ED 119 993 SE 020 391
Lewis, Robert
Engineering: "A Piece of the Action." A Mini-Course.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Pub Date [75]
Note--70p.
Available from -Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Dept. of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 (Free while supply lasts)
EDRS Price MF-$0.83 HC-$3.50 Plus Postage
Descriptors--*Engineering Education, Instruction, Junior High Schools, Science Course Improvement Project, Science Education, *Science Programs, Secondary School Science, Technology, *Units of Study (Subject Fields)
Identifiers--*Del Mod System, National Science Foundation, NSF

It is the purpose of this unit of study to acquaint students with the world of engineering. The activities are intended to simulate problems which might be undertaken by engineers and illustrate the sequence of events leading to their solution. The material is intended for use in the eighth or ninth grades as a supplement or for inclusion into the ongoing science, social studies, and mathematics program. The course is designed to run two to three weeks. Most of the activities are assigned to be completed in a single class period and are designed to produce student involvement. The format of the Teacher Guide includes: title of activity, the major ideas, the behavioral objectives and possible strategy types. Materials and equipment, as well as resources and references, are presented. Suggested answers to questions given and sample data for the experiments are provided. A student activity sheet is given for each lesson. (FB)

ED 121 613 SE 020 729
Nuclear Science, A High School Course.
Pennsylvania State Dept. of Education, Harrisburg. Bureau of General and Academic Education
Pub Date 71
Note--118p.
EDRS Price MF-$0.83 HC-$6.01 Plus Postage
Descriptors--Atomic Theory, Course Content, *Curriculum, *Instruction, Instructional Materials, *Nuclear Physics, Physics, Radioisotopes, Science Education, Secondary Education, *Secondary School Science, *Teaching Guides

This comprehensive guide to the teaching of nuclear science at the secondary level includes recommendations on teaching methods, course and laboratory objectives, textbooks, audiovisual aids, laboratory equipment and experiments, and safety precautions. (MH)

ED 124 370 88 SE 018 322
Bullock, Bob And Others
Automobile Ignition System Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—155p.; Drawings may not reproduce well; For related documents, see SE 018 323-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Electricity, Individualized Instruction, *Instructional Materials, Physics, *Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, *Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was aimed at providing the student with a basic understanding of the construction and operation of the ignition system of an automobile. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages involve studying the fundamentals of electricity and magnetism, investigating electromagnetism, constructing a battery, and examining the construction and operation of a generator, voltage regulator, ignition coil, distributor, condenser, and spark plug. (GS)

ED 124 373 88 SE 018 325
Bullock, Bob And Others
Climatizing the Home Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—116p.; Small, light and broken type in charts and graphs; For related documents, see SE 018 322-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$6.01 Plus Postage.
Descriptors—*Heat, Individualized Instruction, *Instructional Materials, *Physics, Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was aimed at providing students with a knowledge of the physics factors that determine the sensation of climatic comfort and the energy requirements for maintaining this comfort. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages include defining temperature, calibrating a thermometer, defining heat, investigating conduction, connection, radiation, specific heat, heat of fusion, insulating material, humidity, and dew point, and calculating heating loads. (GS)

ED 124 374 88 SE 018 326
Bullock, Bob And Others
Introductory Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—60p.; For related documents, see SE 018 322-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—Individualized Instruction, *Instructional Materials, *Physics, Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District. This is an introductory minicourse aimed at acquainting the student with the realm of physics so that the student can pursue further study by selecting those minicourses most relevant to his career needs and interests. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages include paper puzzles, manipulative puzzles, paper glider construction, analog computer construction, and a number of physics "tricks." (GS)

ED 124 376 88 SE 018 328
Bullock, Bob And Others.
Photography Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—91p.; Photographs and drawings may not reproduce well; For related documents, see SE 018 322 333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—Individualized Instruction, *Instructional Materials, *Photography, *Physics, *Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, Secondary School Science
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was designed to help students acquire a knowledge of some physics of photography and to develop some basic photographic skills. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages involve investigating careers in photography, comparing the camera and the eye, studying some properties of light, making a camera, and taking and developing pictures. (GS)

ED 124 379 88 SE 018 331
Bullock, Bob And Others
The Physics of Sports Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—165p.; Photographs may not reproduce well; For related documents, see SE 018 322-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Athletics, Individualized Instruction, *Instructional Materials, *Physics, *Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was aimed at helping

the student relate the concepts of work, power, energy, momentum, and simple machines to sports. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages involve reviewing the playing details of seven sports, studying a few fundamentals of physics and related mathematics, analyzing some technical physics of seven sports, investigating student horsepower, and analyzing mechanical and anatomical machines. (GS)

ED 124 380 88 SE 018 332
Bullock, Bob And Others
Physics of Toys Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—119p.; Drawings may not reproduce well; For related documents, see SE 018 322-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$6.01, Plus Postage.
Descriptors—Individualized Instruction, *Instructional Materials, *Physics, Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, Secondary Education, Secondary School Science, Technical Education, *Toys
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was aimed at providing students with an understanding of some basic physics principles by playing with toys that have been classified into five different groups on the basis of the principle that each demonstrates. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages involve experimenting with toys that demonstrate force and motion, heat and thermodynamics, wave motion and sound, the principles of light, and electricity and magnetism. (GS)

ED 124 381 88 SE 018 333
Bullock, Bob And Others
Science and Superstition Minicourse, Career Oriented Pre-Technical Physics. Preliminary Edition.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—25p.; For related documents, see SE 018 322-332 and SE 019 605-616
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—Individualized Instruction, *Instructional Materials, *Physics, *Program Guides, *Science Activities, Science Careers, Science Education, Science Materials, *Scientific Methodology, Secondary Education, Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This minicourse was prepared for use with secondary physics students in the Dallas Independent School District and is one option in a physics program which provides for the selection of topics on the basis of student career needs and interests. This minicourse was aimed at providing the student with the opportunity to compare scientific theory with superstition, creating a better understanding of the processes involved in scientifically testing a belief. The minicourse was designed for independent student use with close teacher supervision and was developed as an ESEA Title III project. A rationale, behavioral objectives, student activities, and resource packages are included. Student activities and resource packages involve defining science, scientific method, and superstition, surveying superstitions, and investigating how superstitions develop and are disproved. (GS)

ED 124 384 88 SE 019 607
"Let There Be Light" Minicourse, Career Oriented Pre-Technical Physics.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—134p.; Photographs and shaded drawings may not reproduce well; For related documents, see SE 018 322-333 and SE 019 605-616
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—Instructional Materials, Light, *Optics, Physics, *Program Guides, *Science Activities, Science Careers, Science Education, *Science Materials, Secondary Education, *Secondary School Science, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This instructional guide, intended for student use, develops the concept of light through a series of sequential activities. A technical development of the subject is pursued with examples stressing practical aspects of the concepts. Included in the minicourse are: (1) the rationale, (2) terminal behavioral objectives, (3) enabling behavioral objectives, (4) activities, (5) resource packages, and (6) evaluation materials. Along with a definition of light, the concepts of reflection and refraction and such topics as fiber light and the photoelectric effect are developed. This unit is one of twelve intended for use in the second year of a two year vocationally oriented physics program. (CP)

ED 124 393 88 SE 019 616
"Would You Like to Swing on a Star?" Minicourse, Career Oriented Pre-Technical Physics.
Dallas Independent School District, Tex.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 74
Note—28p.; For related documents, see SE 018 322-333 and SE 019 605-615
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Instructional Materials, Physics, *Program Guides, *Science Activities, Science Careers, Science Education, *Science Materials, Secondary Education, *Secondary School Science, *Space Sciences, Technical Education
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

This instructional guide, intended for student use, provides an exposure of career opportunities in space exploration. The program is developed with use of astronomy and earth science topics, while stressing technical aspects. NASA materials are also used extensively. Included in the minicourse are (1) the rationale, (2) terminal behavioral objectives, (3) enabling behavioral objectives, (4) activities, (5) resource packages, and (6) evaluation materials. This unit is one of twelve intended for use in the second year of a two year vocationally oriented physics program. (CP)

ED 129 605 SE 021 400
Angelo, Joseph A., Jr
Stamps Tell the Story of Nuclear Energy.
Energy Research and Development Administration, Oak Ridge, Tenn.
Pub Date 75
Note—96p., Photographs of stamps may not reproduce well
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—Elementary Secondary Education, *Nuclear Physics, *Physics, *Science History, *Scientists
Identifiers—*Energy Research and Development Administration, ERDA, Postage Stamps

This document provides a summary history of the individual scientists principally responsible for the development of nuclear physics and a survey of modern utilization of atomic energy. Identified throughout the booklet are postage stamps illustrating each individual and topic discussed. (SL)

ED 131 291 CE 008 904
Parsons, Ralph
Jacks--A Study of Simple Machines.
Forsyth Technical Inst., Winston-Salem, N.C.
Spons Agency—North Carolina State Dept. of Public Instruction, Raleigh. Occupational Research Unit.
Report No—VT-103-236
Note—49p.; Page 4 (text and diagram on the hydraulic press) will not reproduce well. For related documents, see CE 008 905-907 and CE 008 966
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Individualized Curriculum, Instructional Materials, Laboratory Experiments, Laboratory Manuals, *Learning Activities, Mechanics (Physics), *Physics Curriculum, Physics Instruction, Secondary Education, Study Guides, Vocational Education
Identifiers—*Jacks (Lifts)

This vocational physics individualized student instructional module on jacks (simple machines used to lift heavy objects) contains student prerequisites and objectives, an introduction, and sections on the ratchet bumper jack, the hydraulic jack, the screw jack, and load limitations. Designed with a laboratory orientation, each section consists of explanatory material with illustrative drawings, an experiment accompanied by a data sheet, suggested audiovisual materials, and review questions. (NJ)

ED 131 292 CE 008 905
Vocational-Technical Physics Project. Thermometers: I. Temperature and Heat, II. Expansion Thermometers, III. Electrical Thermometers. Field Test Edition.
Forsyth Technical Inst., Winston-Salem, N.C.
Spons Agency—North Carolina State Dept. of Public Instruction, Raleigh. Occupational Research Unit.
Report No—VT-103-237
Note—42p.; For related documents, see CE 008 904-907 and CE 008 966
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Individualized Curriculum, Instructional Materials, Laboratory Experiments, Laboratory Manuals, *Physics Curriculum, Physics Instruction, Secondary Education, Study Guides, Technical Education, *Temperature, Vocational Education
Identifiers—*Thermometers

This vocational physics individualized student instructional module on thermometers consists of the three units: Temperature and heat, expansion thermometers, and electrical thermometers. Designed with a laboratory orientation, experiments are included on linear expansion, making a bimetallic thermometer, a liquid-in-gas thermometer, and a gas thermometer, making, testing, and using thermocouples; comparing thermistors with ordinary materials, and calibrating a thermistor. Laboratory data sheets, illustrative drawings, review questions, student prerequisites, and objectives are also included in the module. (NJ)

ED 131 293 CE 008 906
Vocational-Technical Physics Project. The Alternator: I. Current Electricity, II. Magnets from Electricity, III. Electricity from Magnets, IV. Energy Conversion. Field Test Edition.
Forsyth Technical Inst., Winston-Salem, N.C.
Spons Agency—North Carolina State Dept. of Public Instruction, Raleigh. Occupational Research Unit.
Report No—VT-103-238
Note—72p.; For related documents see, CE 008 904-907 and CE 008 966
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Individualized Curriculum, Instructional Materials, Laboratory Experiments, Laboratory Manuals, *Physics Curriculum, *Physics Instruction, Secondary Education, Study Guides, Technical Education, Units of Study (Subject Fields), Vocational Education
Identifiers—*Alternators (Electric Generators)

This vocational physics individualized instructional student module on the alternator consists of the four units: Current electricity, magnets from electricity, electricity from magnets, and energy conversion. Designed with a laboratory orientation, the units present explanations of the concepts and experiments. Laboratory data sheets, illustrative drawings, review questions, student prerequisites and objectives, and lists of suggested audiovisual materials are also included in the module. (NJ)

ED 131 294 CE 008 907
Vocational-Technical Physics Project. Instructor's Manual. Field Test Edition.
Forsyth Technical Inst., Winston-Salem, N.C.
Spons Agency—North Carolina State Dept. of Public Instruction, Raleigh. Occupational Research Unit.
Report No—VT-103-239
Note—48p.; For related documents see, CE 008 904-906 and CE 008 966
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Individualized Curriculum, Laboratory Manuals, *Learning Activities, *Mechanical Equipment, *Physics Curriculum, *Physics Instruction, Secondary Education, Teaching Guides, Technical Education, Vocational Education
Identifiers—Alternators (Electric Generators), Jacks (Lifts), Thermometers

This instructor's manual in vocational physics consists of five modules: Jacks, Thermometers, The Alternator, The Pool Table, and The Radiator. It is an individualized approach, designed for use with accompanying student manuals on each of the individual modules. Each module in the instructor's manual consists of a general description plus an outline of student objectives, prerequisites laboratory exercises, equipment and supplies, audiovisual materials, tests, instructional strategies, and estimated completion time. Appended to the manual is more specific information about equipment and supplies, including sources of supplies and costs. Tests and keys for each of the modules are appended. (NJ)

ED 174 475 SE 028 547
Sabbath, Larry And Others
Oakland County Science Safety Series: Reference Guide for Physics and Physical Science.
Oakland County Schools, Pontiac, Mich.
Pub Date—77
Note—106p.; For related documents, see SE 028 544-546; Not available in hard copy due to copyright restrictions; Contains occasional colored pages which may not reproduce well ; Guide prepared by the Division of Instruction
Available from—Oakland Schools, Division of Instruction, 2100 Pontiac Lake Road, Pontiac, Michigan 48054 ($8.50 complete set; $2.50 ea.)
Pub Type— Guides - General (050)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Class Activities, Elementary Secondary Education, Energy, *Laboratory Procedures, *Laboratory Safety, *Physical Sciences, *Physics, Safety, *Safety Education, School Safety, Science Education, *Scientific Methodology

This reference guide is designed to organize and suggest acceptable practices and procedures for dealing with safety in the area of science instruction. It is intended for use as a reference for teachers, administrators and other school staff for planning science activities and to assist in making safety decisions in a situational context. This guide deals specifically with issues pertinent to the teaching of physics and physical sciences. (Author/RE)

ED 175 710 SE 028 748
Egger, W. M.
Lab Experiments in Energy for High School Physics.
Mississippi State Univ., State College. Cooperative Extension Service.
Spons Agency—Department of Energy, Washington, D.C.
Report No.—MEEC-31
Pub Date—78
Grant—DOE-EU-78-G-05-5873
Note—29p.; For related documents, see SE 028 747-757
Available from—Mississippi Energy Extension Center, P.O. Box 5406, Mississippi State, MS 39762 (no price quoted)
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Curriculum Planning, Energy, *Energy Conservation, *Instructional Materials, Interdisciplinary Approach, *Laboratory Experiments, *Laboratory Manuals, *Science Education, *Secondary Education
Identifiers—*Energy Education, Mississippi

This laboratory unit is designed for a minimum of 15 hours of work. Experiments are designed to fit a complete unit of study on energy, and require only simple, inexpensive, or easily constructed equipment. Motivational questions, objectives, support information, feedback items, and follow-up activities are incorporated into the various experiments. (Author/RE)

ED 182 145 SE 029 863
Phelps, William And Others
Introduction to Nucleonics: A Laboratory Course.
Crystal Lake Community School District 115, Ill.
Spons Agency—Illinois State Office of Education, Springfield. Div. of Vocational and Technical Education.
Pub Date—73
Note—256p.; For related document, see SE 029 864; Not available in hard copy due to marginal legibility of original document
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—*Laboratory Manuals, Laboratory Procedures, *Nuclear Physics, Physics, Physics Curriculum, *Physics Experiments, *Radiation, Radiation Effects, Radiology, *Science Education, Science Experiments, Secondary Education
Identifiers—Energy Education

This student text and laboratory manual is designed primarily for the non-college bound high school student. It can be adapted, however, to a wide range of abilities. It begins with an examination of the properties of nuclear radiation, develops an understanding of the fundamentals of nucleonics, and ends with an investigation of careers in areas related to nuclear radiation. Each experiment is integrated into the text. The small amount of reading material between labs is designed to bridge from one lab to another. (Author/RE)

ED 182 146 SE 029 864
Phelps, William And Others
Introduction to Nucleonics: A Laboratory Course. Teacher's Guide.
Crystal Lake Community School District 115, Ill.
Spons Agency—Illinois State Office of Education, Springfield. Div. of Vocational and Technical Education.
Pub Date—73
Note—224p.; For related document, see SE 029 863; Contains occasional light and broken type
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC09 Plus Postage.
Descriptors—*Laboratory Manuals, Laboratory Procedures, *Nuclear Physics, Physics, Physics Curriculum, *Physics Experiments, *Radiation, Radiation Effects, Radiology, *Science Education, Science Experiments, Secondary Education
Identifiers—Energy Education

This collection of laboratory lessons is designed primarily for the non-college bound high school student. It can be adapted, however, to a wide range of abilities. It begins with an examination of the properties of nuclear radiation, develops an understanding of the fundamentals of nucleonics, and ends with an investigation of careers in areas related to nuclear radiation. Each experiment is integrated into the text. The small amount of reading material between labs is designed to bridge from one lab to another. (Author/RE)

ED 188 862 SE 030 873
De Angelis, Joseph M.
Using Clay as a Learning Resource for Teaching the History of Science.
Pub Date—80
Note—26p.
Pub Type— Guides - Classroom - Teacher (052) — Reports - Descriptive (141)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—*Ceramics, Grade 9, Resource Materials, *Science Activities, Science Course Improvement Projects, Science Education, *Science Equipment, Science Experiments, *Science History, Secondary Education, *Secondary School Science
Identifiers—Introductory Physical Science

Construction of laboratory equipment from earthenware clay uses art as a way to incorporate the element of science history into an Introductory Physical Science (IPS) unit on distillation. Classroom techniques for working with clay to construct distilling apparatus are outlined. Other supplementary material from the arts, including slide presentations on original art work of past laboratories and sketches from primary sources, are also suggested. (CS)

ED 190 376 SE 031 320
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Student Guide: What's Up? Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—157p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored and shaded drawings and print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—Grade 9, *Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, Laboratory Procedures, *Physics, *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Space Sciences
Identifiers—*Intermediate Science Curriculum Study

This is the student's text of one unit of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The chapters contain basic information about rockets, space, and principles of physics, as well as activities related to the subject and optional excursions. A section of introductory notes to the student discusses how the class will be organized. Illustrations accompany all instructions and the students are encouraged to select the proper equipment based on the illustrations. (SA)

ED 190 377 SE 031 321
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Student Guide: What's Up? Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—60p.; For related documents, see SE 031 300-300, ED 035 559-560, ED 049 032, and ED 052 940. Contains photographs and colored print which may not reproduce well.
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, *Physics, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Space Sciences, *Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the student's edition of the Record Book for the unit "What's Up" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). Space is provided for answers to the questions from the student text as well as for the optional excursions and the self evaluation. An introductory note to the student explains how to use the book. (SA)

ED 190 378 SE 031 322
Bonar, John R., Ed. Hathway, James A., Ed.
Probing the Natural World, Level III, Record Book, Teacher's Guide: What's Up? Intermediate Science Curriculum Study.
Florida State Univ., Tallahassee. Dept. of Science Education.
Spons Agency—National Science Foundation, Washington, D.C.; Office of Education (DHEW), Washington, D.C.
Pub Date—72
Note—61p.; For related documents, see SE 031 300-330, ED 035 559-560, ED 049 032, and ED

052 940. Contains photographs and colored print which may not reproduce well.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—*Answer Sheets, Grade 9, Individualized Instruction, Instructional Materials, Junior High Schools, *Laboratory Manuals, *Physics, Records (Forms), *Science Activities, Science Course Improvement Projects, Science Education, Secondary Education, Secondary School Science, *Space Sciences, Worksheets
Identifiers—*Intermediate Science Curriculum Study

This is the teacher's edition of the Record Book for the unit "What's Up" of the Intermediate Science Curriculum Study (ISCS) for level III students (grade 9). The correct answers to the questions from the student text are recorded. An introductory note to the teacher explains how to use the book. Answers are included for the activities and the optional excursions. A self evaluation section is included and followed by its answer key. (SA)

ED 193 061 SE 032 963
Arena, John E. And Others
Computations About the Sources and Conservation of Energy.
Spons Agency—Florida State Dept. of Education, Tallahassee. Office of Environment Education.
Pub Date—79
Note—76p.; Contains occasional light and broken type.
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Elementary Secondary Education, *Energy, Energy Conservation, Environmental Education, *Interdisciplinary Approach, Junior High Schools, *Mathematics Education, Mathematics Instruction, *Resource Materials, *Secondary School Mathematics, Secondary School Science
Identifiers—*Energy Education

Energy-related concepts are the subject of mathematics problems in this supplementary workbook for secondary school students. Exercises involving light, heat, motion, and energy conservation assist students in understanding whole numbers, decimals, fractions, ratios, proportions, percents, and the creation and interpretation of graphs. The individual energy topics and the associated calculations are described together in order to facilitate comprehension of both mathematical operations and scientific concepts. For teachers, each problem is coded according to the type of math skill required. Also provided are a glossary and an answer key. (WB)

ED 046 168 EC 031 252

Science: A Guide for Teaching the Handicapped.

Iowa Univ., Iowa City. Special Education Curriculum Development Center.

Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.

Bureau No—BR-6-2883

Pub Date Nov 70

Note—162p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Curriculum Development, *Educable Mentally Handicapped, *Exceptional Child Education, Guidelines, Mentally Handicapped, Science Activities, *Sciences, *Teaching Guides

Presented are guidelines for planning science programs for the educable mentally retarded at four levels of difficulty: primary, intermediate, junior high, and senior high school levels. Areas of study covered at each level are animals, plants, weather and seasons, the earth, the universe, forces, human beings, and the environment. General objectives, an outline of content, resource materials, suggested experiments, initiatory and assimilating activities, and selected starter units are included. Evaluation sheets are also included. (KW)

ED 060 587 EC 041 515

Morrison, Charlotte

Science: Curriculum Guide for Teaching Gifted Children Science in Grades One Through Three.

California State Dept. of Education, Sacramento. Div. of Special Education.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 70

Note—37p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Curriculum Guides, Earth Science, *Ecology, *Exceptional Child Education, *Gifted, *Primary Grades, Sciences

Identifiers—California

The curriculum guide for teaching science to gifted primary grade children in California focuses on natural science, with an emphasis on ecology. Provided are a general overview of the unit, a set of behavioral objectives, a list of generalizations and concepts, a sample teaching-learning plan for the complete unit, and eight sample lesson plans. Each lesson takes up a different ecological topic: substratum, animal movement, seed dispersal, temperature's influence on environment, light, food, water, and erosion. Each lesson plan includes behavioral objectives, teaching strategies, suggested questions and activities, and suggested resource materials. (KW)

ED 060 588 EC 041 516

Muir, Raquel

Science: A Unit on Microbiology: Curriculum Guide for Teaching Gifted Children Science in Grades Four Through Six.

California State Dept. of Education, Sacramento. Div. of Special Education.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date 70

Note—62p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—Biology, *Curriculum Guides, *Exceptional Child Education, *Gifted, *Intermediate Grades, *Microbiology, Sciences

Identifiers—California

The curriculum guide for teaching science to gifted intermediate grade students presents material to be used for a unit on microbiology, as well as suggestions for a second unit on the subject. Examined in the unit are the structures, functions, growth, development, uses, and environments of different kinds of microorganisms, with an emphasis on bacteria. The first section of the guide, intended for teachers, presents suggested instructional approaches for teaching microbiological concepts and covers both the range of subject matter content and behavioral objectives. The second section, Suggested Learning Activities, is addressed to the student and contains four sample lessons. The third section, meant to be used by both teacher and student, defines scientific and technical terms, presents certain aspects of the classification of microorganisms, and provides directions for 10 technical procedures used in the projects suggested in the guide. Also listed are some resources and references, and recommendations concerning further study in microbiology. (KW)

ED 075 976 EC 051 805

Curriculum Guide Functional Level B Exceptional Child Program.

Pinellas County District School Board, Clearwater, Fla.

Pub Date Jan 73

Note—348p.

EDRS Price MF-$0.65 HC-$13.16

Descriptors—Art, Childhood, *Class Activities, *Curriculum Guides, *Exceptional Child Education, Health Education, Language Arts, Mathematics, *Mentally Handicapped, Music, Physical Education, Safety Education, Sciences, *Skill Analysis, Social Studies

Sequenced instructional objectives (number indicated in parentheses) in the following subjects are listed for students having a chronological age of 8 to 10 years and a mental age of 4 to 8 years: language arts (77), mathematics (70), social studies (89), science (60), health (38), safety (26), physical education (28), art (36), and music (23). The objectives are identified for specific areas (such as reading and speaking skills) of each instructional unit (such as language arts). Teaching strategies such as the following are suggested for each instructional objective: having students sort pictures to find ones that fit certain sentences (auditory skills), having students trace over shaded work (writing skills), having students bundle sticks into groups of 10 each (numeration), setting up a classroom store (money), having students name people, events, or things in the environment which cause them to respond emotionally (self-knowledge), having students demonstrate their abilities to use the sense of taste to gather information about the environment (investigating the senses), having students demonstrate their abilities to wash dishes (sanitation), having students tell the danger of plastic bags (safety at home), having students leap short distances in a coordinated fashion (physical education), having students produce by form and construction a recognizable object (art), and having students describe the emotional moods of assorted musical pieces (music attitudes). Materials corresponding to each teaching strategy are indicated. (For related document, see EC 051 458). (GW)

ED 079 881 **EC 052 199**

Alexander, Lonie And Others

A Curriculum Guide for Teachers of Educable Mentally Handicapped.

Brevard County School Board, Cocoa, Fla.

Pub Date Jul 72

Note—170p.

EDRS Price MF-$0.65 HC-$6.58

Descriptors—Books, Communication Skills, Course Objectives, *Curriculum Guides, *Educable Mentally Handicapped, *Exceptional Child Education, Health, Instructional Materials, Language Development, Mentally Handicapped, Money Management, Music, Program Planning, *School Districts, Social Development, Vocational Education

Identifiers—*Brevard County, Florida

Presented in the curriculum guide for teachers of mentally retarded (EMR) children in Brevard County, Florida, are preprimary, primary, intermediate, junior high school, and occupational training programs. Listed for preprimary level are skills objectives and suggested activities for such areas as auditory discrimination, constancy, and tactual kinesthetics. Given for the primary level are skills objectives and activities to develop communication (such as watching, listening, reading, or working with numbers), and social competencies (pertaining to home, school, health, cultural heritage, science, art, and music). Intermediate level objectives and activities suggested are expanded from primary level to include time, money, and mathematics in the area of communication, and more complexity in social competencies; and included are sample lesson plans for writing, spelling, or money management, and sample units for social studies, science, and primary level. Provided for junior high level are guides for language development, social studies, science, health, safety, and vocational preparation. Given for the three year occupational training program (which includes academic and prevocational work, school employment, and full time employment), are guides for academic instruction, occupational readiness, and specific skill building (such as auto mechanics, building trades, or home economics). Also described are program planning techniques (individualizing students' programs, making referrals, ordering materials and arranging field trips); and procedures for obtaining vocational rehabilitation services. Listed for each level are instructional materials, with sources. (MC)

ED 087 188 EC 061 290

Me and My Environment, Unit IV: Transfer and Cycling of Materials in My Environment, Experimental Edition 1973-74.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 73

Note—710p.; This document contains 355 leaves, all of which are 11 inches wide by 8 1/2 inches high and require two microfiche frames; For related information see EC 050871, EC 050872, EC 050873, EC 050874, EC 050875, EC 061291, EC 061292 and EC 061293

EDRS Price MF-$0.65 HC-$26.32

Descriptors—Adolescents, Behavioral Objectives, Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Inquiry Training, Instructional Materials, Mentally Handicapped, Sciences

The experimental 1973-74 edition of Unit IV consists of 28 life science curriculum activities for 13- to 16-year-old educable mentally handicapped children. The role of the teacher in continuing field trials is noted and environmental themes and elements, inquiry skills, problem solving skills, and applicational behaviors and attitudes are stressed. Directions for using the student records-of-progress and tallysheets are provided for the teachers. The three cores of activities are preceded by suggestions of general aims (e.g., student development of a success syndrome and development of some control over the environment), specific goals, objectives, and a planning guide listing materials needed for each activity. Titles for core A, which contains seven activities on energy and material transfer, include: (1) Making Compost; (2) The Food Chain Game Revisited; and (3) Food Webs in My Community. Titles of some of the activities in Core B--Decomposers in My Environment--are: (1) Starting to Round Up the Food Chain; (2) Talking Rot; (3) Planting in Compost; and (4) A Real Gas. Among the nine activity titles for Core C--Garbage and My Environment--are: (1) Classroom Trash; (2) Every Litter Bit Helps; and (3) The Recycling Pay Off. Activities are organized in terms of materials, teaching strategies, and anticipated student behaviors. An evaluation feedback form accompanies each activity. (MC/SM)

ED 087 189 EC 061 291

Me and My Environment, Unit V: Air and Water in My Environment, Experimental Edition 1973-74.

Biological Sciences Curriculum Study, Boulder, Colo.

Spons Agency—Office of Education (DHEW), Washington, D.C.

Pub Date 73

Note—1,044p.; This document contains 522 leaves, all of which are 11 inches wide by 8 1/2 inches high and require two microfiche frames; For related information see EC 050871, EC 050872, EC 050873, EC 050874, EC 050875, EC 061290, EC 061292 and EC 061293

EDRS Price MF-$0.65 HC-$36.19

Descriptors—Adolescents, Behavioral Objectives, Biology, *Class Activities, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Influences, *Exceptional Child Education, Inquiry Training, Instructional Materials, Mentally Handicapped, Problem Solving, Sciences

The experimental 1973-74 edition of Unit V consists of 35 life science curriculum activities intended for 13- to 16-year-old educable mentally handicapped adolescents. The role of the teacher in continuing field trials is noted and environmental themes and elements, inquiry skills, problem solving skills, and applicational behaviors and attitudes are stressed. Directions for using the student records-or-progress and tallysheets are provided for the teachers. The seven cores of activities are preceded by suggestions of general aims (e.g., student development of a success syndrome and development of some control over the environment), specific goals, objectives and a planning guide listing materials needed for each activity. Cores A through D--which focus on needs, sources, processes and management associated with water--contain 21 activities with titles such as (1) Living Things Are Mostly Water; (2) A Trip to the Water Plant; and (3) Microbes in Water. Titles for the 14 activities contained in cores E through G--on components, change agents and additives in air--include: (2) Testing for Carbon Dioxide and Oxygen, (2) Weather and Air; and (3) Do We Need a Filter On Our Town? Activities are organized in terms of materials, teaching strategies, and anticipated student behavior. An evaluation/feedback form accompanies each activity. (MC/SM)

ED 087 623 **SE 016 806**

Solis, Juan D.

Learning Achievement Packages in Sciences-Biology: Cell Theory, Mitosis, Magnification, Wounds.

Calexico Unified School District, Calif.; Education Service Center Region 13, Austin, Tex.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C. Div. of Bilingual Education.

Pub Date Feb 73

Note—79p.

EDRS Price MF-$0.65 HC-$3.29

Descriptors—*Bilingual Education, Biology, *Curriculum Guides, First Aid, *Instructional Materials, Science Curriculum, Science Education, *Secondary School Science, *Spanish Speaking, Units of Study (Subject Fields)

Identifiers—Elementary Secondary Education Act Title VII, ESEA Title VII

This publication presents four science curriculum units designed to meet the learning problems of students with special language handicaps. The materials are written in both English and Spanish, and deal with topics in biology suitable for students in grades 7 through 11. All four units were classroom tested during 1970-1972 in the Calexico Unified School District (California). The four Learning Achievement Packages (LAPs) are entitled Cell Theory, Mitosis, Magnification, and Wounds. The LAP on "Cell Theory" shows that almost all living organisms are composed of cells, and examines cellular ultrastructures and their functions. "Mitosis" discusses the process of cell reproduction, and "Magnification" instructs the student in the correct use of the microscope. The LAP dealing with "Wounds" is intended for use in first aid instruction. This work was prepared under an ESEA Title VII contract. (JR)

ED 088 244 **EC 061 294**

A Curriculum Guide for Primary and Intermediate Special Education in the Opelika City Schools. Revised Edition.

Opelika City Schools, Ala.

Spons Agency—Alabama State Dept. of Education, Montgomery.; Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Report No—10-69-0179

Pub Date 72

Note—314p.; See EC 061295 for related information

EDRS Price MF-$0.75 HC-$15.00

Descriptors—*Behavioral Objectives, Childhood, Communication Skills, *Curriculum Guides, Elementary School Students, *Exceptional Child Education, Handicapped Children, *Individualized Instruction, Mathematics, Physical Education, *Special Education

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Presented is a curriculum guide for primary and intermediate special education in the areas of communication skills, arithmetic, science, and physical education. The guide, prepared by the Opelika (Alabama) schools, is said to be based on assumptions such as the values of structured individualized learning, use of materials which do not require reading ability, and development of feelings of competence. Noted is the belief that special education students can learn more in less time if provided with an appropriate curriculum. Major knowledge and skill groupings are presented as either a stimulus-response training sequence or as a continuum of sequential education units. It is stressed that the multi-level program provides for differences in learning pace through achievement of objectives at six sequential plateaus. Briefly considered are a procedure for instructional placement, differences between training and education components, and meanings of terms such as percept, generalization, and competency. Provided for oral, pictorial, and written communication skills are 198 objectives. Approximately 450 arithmetic objectives are listed and coordinated with commercial programs for the subject areas of location and direction, measurement, time and motion, money concepts, numbers and grouping, fractions, and geometric forms. The 525 science objectives deal with concepts about the earth, plants, animals, people, and matter and energy. The physical education component stresses fundamental movements with emphasis on balance and posture, body image and differentiation, and perceptual-motor match. (DB)

ED 089 483 **EC 061 396**

Owens, Jean

Project Success for the SLD Child, Curriculum Modification.

Wayne - Carroll Public Schools, Wayne, Nebr.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.; Nebraska State Dept. of Education, Lincoln.

Pub Date [74]

Note—246p.; For related information see EC 061395, EC 061397, and EC 061401

EDRS Price MF-$0.75 HC-$11.40 PLUS POSTAGE

Descriptors—Art Education, *Class Activities, *Curriculum Guides, Diagnostic Teaching, *Elementary School Students, *Exceptional Child Education, Health Education, Instructional Materials, *Language Handicapped, Learning Disabilities, Mathematics, Music, Perceptual Development, Science Activities, Social Studies

Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Nebraska

The curriculum modification guide, developed by project success (Nebraska) through a Title III grant for language disabled elementary level students, contains suggested activities and instructional materials to be used in units of art, health, mathematics, music, science, and social studies. Explained are program planning, criteria for selecting instructional materials, and goals. The curriculum modifier (a consultant to teachers) is said to perform functions such as preparing individualized prescriptions, selecting appropriate instructional materials and collecting data for ongoing evaluation of students. A chart based on the modifier's tasks specifies teacher behavior, task analysis, and student behavior. Usually specified for subject areas are teacher instructions, activities, instructional materials, grade level(s), skills to be developed, and sources for materials. Art activities such as stringing beads to make a necklace are suggested for developing visual and motor perception. Activities such as visiting a grocery store are suggested for 18 health units featuring aspects such as alcohol, dental health, and safety. Offered for 38 subcategories pertaining to number operations, measurement, geometry, and computation in mathematics are activities such as preparing a bingo game using fractions. Provided in the science section is a model unit on plant growth. Social studies activities are given for the following grade level units (number of topics per unit are in parentheses): grade 1, the family (27); grade 2, the neighborhood (14); grade 3, cities (18); grade 4, Nebraska (13) and geography (18); grade 5, U.S. (17); and grade 6, Canada and Latin America (15). (MC)

ED 091 902 **EC 062 126**

Curriculum Guidelines for Exceptional Children: EMR 1970-71 Revision.

Escambia County Board of Public Instruction, Pensacola, Fla.

Pub Date [71]

Note—156p.

EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE

Descriptors—Behavioral Objectives, Curriculum, *Educable Mentally Handicapped, English, *Exceptional Child Education, Family Life Education, *Guidelines, Health Education, Language Arts, Mathematics, Mentally Handicapped, Physical Education, *Prevocational Education, Resource Guides, Secondary School Students, Social Studies, *Vocational Education

Identifiers—Florida

This document provides curriculum guides for teaching educable mentally retarded middle school (prevocational level) and high school (vocational level) students in Escambia County, Florida. It includes a definition of mental retardation, characteristics of mentally handicapped (MH) children, a mental age reference chart, and suggestions for lessons preparing. It explains the program emphasis on attainment of physical, personal and social, and vocational skills. Among aspects covered at the prevocational level are: (1) goals such as development of fine and gross motor skills; and (2) instructional objectives and curriculum components in the areas of mathematics, language arts, home and family living, reading, health and safety, social studies, science, and physical education. For the prevocational level the guide provides a sample of 4-week unit on food; lists of resources (books and demonstration materials); a suggested daily schedule; a community job survey; a guide to phonics instruction; and lists of equipment, books, and sources of free materials in areas such as banking. For the vocational level it offers a review of the program, program goals such as acquisition of home management skills; criteria for graduation; a description of the work study program; suggested job tasks such as assembling nuts and bolts; suggested job training locations such as animal hospitals; and instructional objectives and curriculum components in areas of home and family living, mathematics, science, English, and social studies. Lists of references and curriculum guides to be used with MH students are also included. (MC)

ED 093 593 **SE 016 908**

Balance of Nature. Environmental Education Curriculum.

Topeka Public Schools, Kans.

Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.

Pub Date Aug 73

Note—76p.

EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE

Descriptors—Conservation Education, Curriculum Guides, *Ecological Factors, *Ecology, *Educable Mentally Handicapped, *Environmental Education, Learning Activities, Natural Resources, *Natural Sciences, Unit Plan

Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

The relationship that exists among living and nonliving things on earth is very delicate and important. This unit is designed to provide information on nature's balance which is of interest to and understood by special education students. The unit activities are intended for use by level 2 and level 3 educable mentally retarded students. There are four topics: (1) Necessities of Life, (2) Food Getting Among Animals, (3) Field Trip—Wildlife Homes and Food Supply, and (4) Man and Wildlife. For each topic, there are behavioral objectives, student activities, and teacher suggestions. The objectives taught can be evaluated by the pretest and posttest developed for the unit. The appendix provides teaching aids designed to help the teacher meet the needs of individual students. (JP)

ED 093 594 SE 016 909
Environmental Fundamentals. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Aug 73
Note—273p.
EDRS Price MF-$0.75 HC-$12.60 PLUS POSTAGE
Descriptors—Curriculum Guides, *Ecological Factors, *Ecology, *Environmental Education, *Fundamental Concepts, Intermediate Grades, Learning Activities, Natural Resources, *Natural Sciences, Unit Plan
Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

This unit presents materials to develop some of the basic knowledge necessary for grasping the complex processes associated with environmental relationships. It is divided into five topics: (1) Basic Needs for Life–the biological necessities of plants and animals; (2) Food Web–the interactions between organisms, (3) Observational Skills–ways people can become more aware of their surroundings; (4) Field Trip–first hand observation and data collection; and (5) Environmental Changes: Natural and Man Influenced–the effects man has on natural changes. For each topic there are behavioral objectives, student activities, and teacher suggestions. Special teaching aids are found in the appendix. (JP)

ED 093 595 SE 016 910
Insects and Spiders. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jun 73
Note—71p.
EDRS Price MF-$0.75 HC-$3.15 PLUS POSTAGE
Descriptors—*Biological Influences, Curriculum Guides, Ecological Factors, *Ecology, *Educable Mentally Handicapped, *Environmental Education, Learning Activities, *Natural Sciences, Unit Plan
Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

This unit is designed to provide information on insects and spiders that special education students are capable of understanding. The activities are aimed at level 2 and level 3 educable mentally retarded classes. There are four topics: (1) Characteristics and Life Cycles of Insects; (2) Characteristics of Spiders; (3) Habitats and Food Sources of Insects and Spiders; and (4) Benefits of Insects. For each topic there are behavioral objectives, student activities, and teacher suggestions. The objectives taught can be evaluated by the pretest and posttest developed for the unit. The appendix provides teaching aids designed to help the teacher meet the needs of individual students. (JP)

ED 093 596 SE 016 911
Knowing and Using Your Environment. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Mar 73
Note—173p.
EDRS Price MF-$0.75 HC-$7.80 PLUS POSTAGE
Descriptors—Curriculum Guides, *Ecological Factors, *Ecology, *Environmental Education, *Geology, Intermediate Grades, Natural Resources, Natural Sciences, Recreation, *Water Resources
Identifiers—*Elementary Secondary Education Act Title III, ESEA Title III

This unit is intended to help students become aware of overall relationships and interactions that exist between the various segments of the environment. The unit consists of four topics: (1) Geology--The geological history of the earth as illustrated by fossils; (2) Plants and Animals–the role and interactions of plants and animals in the environment; (3) Rivers and Reservoirs–the uses, patterns, and locations of rivers and reservoirs in Kansas; and (4) Archery–an example of a nondestructive recreational use of the environment. For each topic there are behavioral objectives, student activities, and teacher suggestions. Teaching aids are found in the appendix. (JP)

ED 093 694 SE 018 031
Hopkins, Roberta
Supplementary Kits for Individualized Instruction.
Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.
Spons Agency—National Science Foundation, Washington, D.C.
Report No—NSF-GW-6703
Pub Date Jun 73
Note—15p.
Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($1.00, make checks payable to the Del Mod System)
EDRS Price MF-$0.75 HC-$1.50 PLUS POSTAGE
Descriptors—*Autoinstructional Aids, *General Science, Individualized Instruction, Instruction, Instructional Materials, Learning Disabilities, *Middle Schools, Science Education, Science Instruction, Secondary School Science, Teacher Developed Materials
Identifiers—*Del Mod System

The purpose of the kits is to facilitate the teaching of basic science skills. The kits can be used in the regular classroom for which they were designed or as instruments for teaching of students in learning disability classes. The kits are designed in the areas of plants, animals, metric measurement, chemistry, geology, and space study. Each kit includes the titles of the activities, a suggested level, objectives and necessary supplies needed. A guide to kit assignment by process is presented as well as a table indicating breakdown of kits by grade level. (EB)

ED 094 514 EC 062 458
Bibliography of Materials for the Secondary Educable Mentally Retarded.
Georgia State Dept. of Education, Atlanta. Div. of Special Education.
Pub Date Apr 74
Note—118p.
EDRS Price MF-$0.75 HC-$5.40 PLUS POSTAGE
Descriptors—*Bibliographies, Counseling, *Educable Mentally Handicapped, *Exceptional Child Education, *Instructional Materials, Mathematics, Mentally Handicapped, Reading, Resource Guides, *Secondary School Students, Social Studies, Vocational Education
Identifiers—Georgia

Presented is a bibliography of approximately 500 instructional materials which are intended for use with educable mentally retarded students in secondary school. It is noted that the Georgia Department of Education compiled the bibliography for reference purposes but does not recommend or endorse the materials. Given are title, publisher, price, grade level, media, notes, and subtitles for materials in the following 14 subjects: art, driver's education, English, guidance and counseling, health, mathematics, physical education, professional materials, reading, science, spelling, social studies, and vocational education. Provided is a list of publishers (with addresses) from whom the materials can be obtained. (MC)

ED 097 217 SE 018 224
Water Pollution. Environmental Education Curriculum. Revised.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jul 73
Note—49p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Conservation Education, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Education, Exceptional Child Education, Instruction, Instructional Materials, Learning Activities, Natural Resources, *Pollution, *Water Pollution Control, Water Resources
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Water is one of the most polluted resources in our environment. Since everyone has the same basic need for pure water, it follows that all people should have a basic knowledge of the causes, results and solutions to the water pollution problem. This unit is designed for use with Level II and III educable mentally retarded students to present information on water pollution on the following four topics: (1) The Importance of Clean Water, (2) Sources of Water Pollution, (3) Effects of Water Pollution, and (4) Solutions to Water Pollution. For each topic there are behavioral objectives, student activities and teacher suggestions. The appendix includes teaching aids that can be removed for duplication. (Author/MLB)

ED 100 078 EC 070 552
Miller, Rozelle J. And Others
A Teachers' Guide for Exceptional Children and Youth. Parts 1 and 2.
Michigan Univ., Ann Arbor. Inst. for the Study of Mental Retardation.
Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.; Department of Defense, Washington, D.C.
Pub Date 73
Grant—OEG-0-71-1672(603)
Note—912p.; Most pages are horizontal each requiring 2 microfiche frames; For Parts 3 and 4 and the final project report see EC 070 553 and 554
EDRS Price MF-$1.50 HC-$43.80 PLUS POSTAGE
Descriptors—Auditory Training, Behavioral Objectives, Body Image, Elementary Education, Exceptional Child Education, Handwriting, *Learning Disabilities, Mathematics, *Mentally Handicapped, Military Personnel, Motor Development, Reading, Sciences, Secondary Education, Spatial Relationship, Spelling, Task Analysis, *Teaching Guides, Visual Perception
Identifiers—*United States Dependent Schools European Area

Presented are Parts 1 and 2 of a teaching guide designed for use in the United States Dependent Schools in the European Area. It provides a developmental, task analysis approach for teaching elementary and secondary level mentally retarded and learning disabled students. Included in Part 1 are steps for use of the guide, an explanation of task analysis, a curriculum guide for assessing and developing pre-academic skills (such as gross motor, visual motor, and auditory skills), an ability attainment form for recording a pupil's progress, and a selected annotated bibliography of 39 entries. Part 2 consists of curriculum guides in reading, handwriting and spelling, mathematics, and science. Each curriculum unit lists target abilities (presented in behavioral terms in developmental order), assessment items for each ability, content-development and reinforcement activities for many of the abilities, and supplemental teaching resources and strategies (which are cross referenced to Part 4 in another volume). (LS)

ED 100 079 EC 070 553
Miller, Rozelle J. And Others
A Teachers' Guide for Exceptional Children and Youth. Parts 3 and 4.
Michigan Univ., Ann Arbor. Inst. for the Study of Mental Retardation.
Spons Agency—Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.; Department of Defense, Washington, D.C.
Pub Date 73
Grant—OEG-0-71-1672(603)
Note—912p.; Most pages are horizontal each requiring 2 microfiche frames; For Parts 1 and 2 and the final project report see EC 070 552 and 554
EDRS Price MF-$1.50 HC-$43.80 PLUS

POSTAGE
Descriptors—Behavioral Objectives, Career Education, Elementary Education, Exceptional Child Education, Instructional Materials, Interpersonal Competence, *Learning Disabilities, *Mentally Handicapped, *Military Personnel, Resource Guides, Secondary Education, Self Concept, Task Analysis, *Teaching Guides, Teaching Methods, Unit Plan
Identifiers—*United States Dependent Schools European Area

Presented are Parts 3 and 4 of a teaching guide designed for use in the United States Dependent Schools in the European Area. It provides a developmental, task analysis approach for teaching elementary and secondary level mentally retarded and learning disabled students. In Part 3 specific instructions are provided for developing two major curriculum areas, personal-social development and the world of work, and for writing experience units which span a variety of curriculum areas. Each curriculum unit lists target abilities (presented in behavioral terms in developmental order), assessment items for each ability, content-development and reinforcement activities for many of the abilities, and supplemental teaching resources and strategies (cross referenced to Part 4). Three teaching units (Ways We Move, Safety, and Orientation to the World of Work) and four subunits (Cooking, Pets, Living in Our American Village, and Use and Abuse of Drugs) are given as examples of experience units. Part 4 lists teaching resources (such as basic texts and kits) and teaching strategies (such as experience charts, learning centers, and educational games) for use with curriculum units. (LS)

ED 101 937 95 SE 017 399
Energy and You. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jan 74
Note—70p.
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—*Conservation Education, Curriculum Guides, *Educable Mentally Handicapped, *Energy, Energy Conservation, *Environmental Education, Instructional Materials, Learning Activities, Natural Resources, Outdoor Education, *Science Education, Teaching Guides, Units of Study (Subject Fields)
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

The causes of the energy crisis are many, and the solutions are complex. Since every person in the world is affected, every person should have an understanding of the energy shortage problem. This unit is designed around the following two ideas: (1) to develop an understanding of energy and the need for it, and (2) to understand some of the causes, effects, and solutions of the energy crisis. It attempts to present information regarding energy problems for level II and III educable mentally retarded students. Included are four topics: (1) What Is Energy, (2) Energy Fuels, (3) How We Use Energy, and (4) Conservation of Energy. For each topic there are behavioral objectives, student activities, and teacher suggestions. The numbers in parentheses by the activity number indicate the objectives the activity helps develop. The unit also includes goals and objectives, an objective summary sheet, a unit time line, a materials sheet, and 20 appendixes which contain various teaching aids related to the activities and which are also suitable for duplication. (TK)

ED 101 939 95 SE 017 401
The Winter Environment. Environmental Education Curriculum.
Topeka Public Schools, Kans.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date Jan 73
Note—60p.
EDRS Price MF-$0.76 HC-$3.32 PLUS POSTAGE
Descriptors—*Conservation Education, *Curriculum Guides, *Educable Mentally Handicapped, *Environmental Education, Instructional Materials, Learning Activities, Natural Resources, Outdoor Education, *Science Education, Teaching Guides, Units of Study (Subject Fields)
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III, Seasons, Winter

Winter seems to hold more mysteries than any other season. It changes the behavior of wildlife and also brings about drastic changes in plant life. This unit, designed around the following two ideas: (1) to develop an appreciation and understanding of the winter season and (2) to understand how plants and wildlife are affected by the winter season, attempts to provide a study of the winter season on a level that special education students can understand. The activities are aimed at level II and III educable mentally retarded special education classes. There are four topics: (1) The Season of Winter, (2) Wildlife in Winter, (3) Field Trip–Plants in the Winter, and (4) Wildlife in Winter–A Continuation of Topic 2. For each topic there are behavioral objectives, student activities, and teacher suggestions. The number in parentheses by the activity number indicates the objectives the activity helps develop. The unit also includes goals and objectives, an objective summary sheet, a unit time line, a materials sheet, and 18 appendixes which contain various teaching aids related to the activities. (TK)

ED 109 849 EC 073 258
A Suggested Course of Study and Curriculum Guide for Educable Mentally Retarded Pupils in Junior-Senior High School.
Kern County Superintendent of Schools, Bakersfield, Calif.
Pub Date 70
Note—119p.
EDRS Price MF-$0.76 HC-$5.70 PLUS POSTAGE
Descriptors—*Curriculum Guides, *Educable Mentally Handicapped, Exceptional Child Education, Health, Job Skills, *Language Arts, Mathematics, Mentally Handicapped, Personal Adjustment, Physical Development, Safety Education, Sciences, *Secondary Education, Social Adjustment, *Social Studies

Presented is a curriculum guide for educable mentally retarded pupils in grades seven through twelve. Summarized are objectives for the junior high level (including personal and social adjustment) and the senior high level (such as recreational and leisure time skills). Goals, activities, and suggested topics for experience units are listed for grades 7-8, 9-10 and 11-12 in the following curriculum areas: personal and social adjustment, occupational competence, health, physical development, safety, oral language arts skills, written language arts skills, number concepts, science, geography, history, and civics. Audiovisual materials are listed according to curriculum areas for junior and senior high levels. (CL)

ED 109 850 EC 073 259
A Suggested Curriculum Guide for Educable Mentally Retarded Children in Elementary School.
Kern County Superintendent of Schools, Bakersfield, Calif.
Pub Date 70
Note—78p.
EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE
Descriptors—*Curriculum Guides, *Educable Mentally Handicapped, *Elementary Education, Exceptional Child Education, Health, *Language Arts, Mathematics, Mentally Handicapped, Personal Adjustment, Physical Development, *Program Descriptions, Safety Education, Sciences, Social Adjustment

Presented is a curriculum guide and description of a program for educable mentally retarded elementary school children. Considered are such program aspects as philosophy and rationale, pupil selection and school-community relations. Goals, activities and suggested topics for experience units are listed for grades K-3, 4-6, and 7-8 in the following curriculum areas: personal and social adjustment, health habits, physical development, safety, oral and written language arts skills, number concepts, and elementary science. Listed are selected resource materials for the curriculum areas. Four appendixes provide information on legal aspects and implications, evaluation of the child's progress and a diagram of classroom layout. (CL)

ED 112 652 EC 080 218
Brandwein, Paul F.
Teaching Gifted Children Science in Grades Seven Through Twelve.
California State Dept. of Education, Sacramento.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date 75
Note—58p.; For related information, see EC 050 876, EC 050 877, EC 050 878, EC 051 699, EC052 456, EC 052 631, EC 052 632, EC 060 220, EC 061 311, EC 070 972, and EC 070 973 and EC 061 312
EDRS Price MF-$0.76 HC-$3.32 Plus Postage
Descriptors—*Curriculum Development, Exceptional Child Education, *Gifted, *Independent Study, Individual Characteristics, *Sciences, Secondary Education, Skill Development, Teacher Role, *Teaching Guides

One of a series of publications for teachers, consultants, and administrators, the guide offers recommendations for curriculum development and science instruction for gifted students in grades 7-12. Discussed in the introductory chapter is creation of a school environment that fosters skills of interdependence (Communication with other scientists) as well as independent inquiry. Chapter 2 deals with characteristics and identification of gifted secondary students, the teacher's role in stimulating scientific interest, differences between conventional and singular giftedness, and the functions of the lecture and investigative approaches. Among the topics explored in a chapter on curricular strategies are types of curricula (such as the learning activity package or LAP program), a conceptually based curriculum, and instruction in investigative arts. A final chapter focuses on independence training, designing and evaluating LAPs for the junior high curriculum, and a consortium module for senior high curricula. (LH)

ED 115 032 EC 080 478
Classroom Management Systems for Implementation of Individualized Instruction; Utilizing Science in Programs for the Handicapped.
Yonkers City School District, N.Y.
Spons Agency—New York State Education Dept., Albany. Div. for Handicapped Children.
Pub Date Jun 74
Note—101p.; Proceedings from Special Study Institute (Yonkers, New York, June 26-28, 1974)
EDRS Price MF-$0.76 HC-$5.70 Plus Postage
Descriptors—*Conference Reports, Elementary Secondary Education, Exceptional Child Education, *Handicapped Children, *Individual Activities, Individualized Instruction, *Science Activities, *Sciences

Presented are proceedings and products from a special study institute on individualized instruction in science for the handicapped (New York, 1974) in which both teachers of the handicapped and regular classroom teachers participated. It is explained that objectives of the institute included acquainting teachers of special education with the research and development in the areas of science education, and developing competencies in writing instructional objectives for the classroom. Information provided includes the names of participants and a program outline. The major portion of the document consists of approximately 80 science activity cards developed by participants to teach topics such as textures, directionality, following a recipe, temperature, and magnets. Each activity card includes the following information: area taught by the developer of the activity (such as educable mentally retarded or learning disabled students), suggested grade level for the activity, title of activity, objectives, materials, and procedures. (LS)

ED 134 408 SE 021 392
Schwar[illegible], Jonathan R
Nature Trails for the Visually Impaired.
Syracuse Univ., N.Y. Environmental Studies Inst.

Pub Date 76
Note—47p.; Contains occasional light and broken type
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Educational Facilities, *Educational Research, *Handicapped, *Nature Centers, *Outdoor Education, *Visually Handicapped
Identifiers—Nature Trails

Many interpretive nature trails have been established for the visually impaired in recent years. The objectives of the investigation were to (a) identify what has been done in the past in the way of nature trail design for the visually impaired, (b) compare this with what professional workers for the visually impaired consider important in the design of the facilities, and (c) to provide guidelines for the design of future trails for the visually impaired. It was determined that the "typical" nature center was over five miles from the nearest urban center, not on public transportation lines, and provided a single special trail for the visually impaired with guide ropes and braille signs. As a result of the literature search, the informal interviews with visually impaired students, and the survey of Orientation and Mobility Instructors, the following suggestions are made for the design of future nature trails: (1) No special trails should be established, as these tend to isolate the visually impaired from the rest of the visitors; (2) all trails should be clearly differentiated from the surrounding environment so that the visually imparied can use residual sight or proper mobility techniques for travel; ropes are unnecessary and often vandalized; (3) special pavement is not needed; (4) railings should be provided at hazardous areas; and (5) interpretation should be offered through the use of portable cassette tape players, and booklets for the hard of hearing. (Author/RH)

ED 135 192 EC 093 168
Kanigher, Herbert
Everyday Enrichment for Gifted Children at Home and School.
National/State Leadership Training Inst on the Gifted and Talented, Los Angeles, Calif
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date Jan 77
Note—100p
Available from—James F. Cowan, E.D., Ventura County Superintendent of Schools Office, County Office Building, Ventura, California 93001 ($3.75)
EDRS Price MF-$0.83 HC-$4.67 Plus Postage.
Descriptors—Art, Child Rearing, Elementary Secondary Education, *Enrichment Activities, Geography, *Gifted, Mathematics, Music, *Parent Role, Reading, Sciences
Identifiers—*Parent Resources

Intended for parents of gifted and talented children, the book provides enrichment suggestions in the areas of art, geography, reading and language, math, music, and science. It is emphasized that the activities should be relaxed and fun. Art activities include visits to see art, photography, trying various art techniques, and learning about the schools of art. Geography experiences are organized under headings such as the compass, three dimensional maps, topographical models, and planning a weekend trip. A large number of reading and language activities include sharing stories aloud, making book jackets, planning and performing a puppet show, collecting books, making a time line, and creative writing. Math projects described include kitchen mathematics, purchase of floor coverings, a bank account, the stock market, and probability. Such suggestions as learning to play a simple instrument and visiting musical performances are described in the section on music. A large section provides suggestions for science activities including plant experiments, use of a microscope, ecology, weather, machines, and space science. (DB)

ED 136 509 EC 100 024
Project Talented and Gifted, End of Grant Report. (ESEA Title III) Appendix IV: Part 1 of Two Bindings.
Pub Date [77]
Note—148p.; For related documents, see EC 092 051 and EC 092 052
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Educational Resources, Elementary Secondary Education, Exceptional Child Education, *Gifted, *Instructional Programs, *Learning Activities, Learning Modules, Resource Guides, Science Units, Social Studies Units, *Talented Students, *Teacher Developed Materials, Teaching Methods, *Units of Study

Presented is a collection of instructional program units, or mini-workshops, developed by the coordinators and resource personnel working in Project Talented and Gifted and used by students participating in the project at the elementary and secondary level. Sections on each topic usually cover objectives and outlines of each session in the workshop, materials needed, a bibliography of resources, suggested resource persons, topics for individual research, library skills needed, and modes of presentation. Included are units on such topics as physiology and heredity, electronics, solar energy, bicycle maintenance, animal behavior, ornithology, archaeology, meteorology, astronomy, statistics, and ecology. (IM)

ED 136 530 EC 100 258
Meyers, Celeste, Ed.
The Live Oak Curriculum: A Guide to Preschool Planning in the Heterogeneous Classroom.
Alpha Plus Corp., Piedmont, Calif.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 77
Grant -OEG-0-74-0529
Note—354p.; For related information, see EC 100 259 and EC 100 260
Available from—Circle Preschool, 9 Lake Avenue, Piedmont, California 94611 ($20.00, includes Individual Assessment)
EDRS Price MF-$0.83 HC-$19.41 Plus Postage.
Descriptors—*Class Activities, Cooking Instruction, *Curriculum Guides, Dramatics, Early Childhood Education, *Handicapped Children, Handicrafts, Language Arts, Mathematics, Motor Development, Music Activities, *Preschool Education, Regular Class Placement, Science Activities
Identifiers—Education of the Handicapped Act

Presented is a curriculum guide for preschool programs serving both handicapped and nonhandicapped children. It is explained that the guide is intended to suggest classroom activities which will strengthen existing skills and encourage development of new skills. The guide presents information on objectives, materials and procedures for the following nine program areas (with sample activities in parentheses): materials (vegetable printing, carpentry, and lipstick murals); self image/multi-cultural (life-size self-portraits, parade preparation for Chinese New Year); language arts (matching and sorting by sight, sequencing pictures, storytelling); dramatic arts (puppet shows, role playing, story dramatization); movement (pre-relay races, creative games, memory games); music (songs to encourage group spirit, foster rhythm, and teach concepts); mathematics (number puzzle, geometric shape houses, ordering objects by size); science (magnets, environmental collage, anatomy activities); and cooking (recipes which emphasize measurements, no-cook recipes, and recipes which emphasize sensory experiences). (CL)

ED 140 569 EC 101 199
Goodman, Libby And Others
Curricular Materials for Secondary Learning Disabilities Programs. Title III: Curricular Development for Secondary Learning Disabilities.
Montgomery County Intermediate Unit 23, Blue Bell, Pa.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW OE), Washington, D.C.
Pub Date 76
Note—375p.
EDRS Price MF-$0.83 HC-$19.41 Plus Postage.
Descriptors—Career Education, Consumer Education, *Curriculum, Health, *Instructional Materials, Language Arts, *Learning Disabilities, Mathematics, Reading, Sciences, Secondary Education, Social Studies, Spelling

Information is presented on approximately 600 curriculum materials for secondary learning disabled students. Listed are the title and publisher, interest and instructional level, format type, and a brief description for materials in nine curriculum areas: career education, reading, language arts, spelling, math, social studies, consumer education, science, and health. (CL)

ED 140 601 EC 101 238
Sorensen, Bobbi, Ed. Addison, Linda, Ed.
"Model" Units for the Gifted. [A Compilation of Units for Gifted Students Based on Four Theoretical Models.]
Pub Date 77
Note—139p.; Best Available Copy, print on some pages is marginal and may not reproduce well
Available from—Linda Addison Enrichment Classes, FAO 170, University of South Florida, Tampa, Florida 33620 ($4.00)
EDRS Price MF-$0.83 HC-$7.35 Plus Postage.
Descriptors—*Activity Units, Archaeology, Art, Astronomy, Conceptual Schemes, Cooking Instruction, Creativity, *Curriculum Guides, Elementary Secondary Education, *Gifted, History, *Learning Activities, Legal Education, *Models, Mythology, Preschool Education, Problem Solving, Sciences, *Teacher Developed Materials, Transportation

Intended for teachers of the gifted, the book contains a compilation of teacher-developed units written for use with students from preschool through high school. Units are divided into four sections: one for each of four theoretical models--Bloom's Taxonomy of Educational Objectives, Guilford's Structure of the Intellect, Taylor's Multiply Talents Model, and Williams Model for Implementing Cognitive-Affective Behaviors in the Classroom. Each model is explained in introductory sections preceding unit activities. A Potpourri unit is also provided. Units in each section are noted to illustrate how the model could be the structure for the curriculum. Subjects covered by unit activities include the following: pets, transportation, work in the kitchen, science laboratory, creative problem solving, archaeology, history of timekeeping, astronomy and space travel, mythology, age of chivalry, art appreciation, creative problem solving through art, and law instruction. (SBH)

ED 180 814 SE 029 543
Jennings, Frederick Metro, Peter M.
Ecology for the Exceptional Child, Grades 7-12 EMR.
Rocky River Public Schools, Ohio.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.
Pub Date—[77]
Note—158p.; Contains occasional light and broken type
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—Conservation Education, *Ecology, Environment, *Environmental Education, *Exceptional Child Education, *Mental Retardation, Natural Resources, *Outdoor Education, Science Activities, Science Education, Secondary Education, *Special Education, Teaching Guides

This guide presents a student-centered program of outdoor education for students of differing exceptionalities. The role of the teacher is intended to be one of support and guidance with student involvement being essential. The manual contains activities for large groups, small groups, and individuals. Activities direct students toward learning related to their environment, and toward increased sensitivity and awareness of the aesthetics of their surroundings. Each activity includes a rationale, a terminal objective statement, an instructional objective, and suggested activities. Sufficient curriculum materials are provided for a continuous three-year program. (Author/RE)

ED 182 107 SE 029 368
It's Time to Challenge the Gifted: Some Tested Lessons, K-9.
Minnesota State Dept. of Education, St. Paul. Div. of Instruction.
Pub Date—76
Note—76p.; Contains occasional light and broken type
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.

Descriptors—*Academically Gifted. *Curriculum Enrichment, Elementary Education, Elementary School Mathematics, Elementary School Science, English, Enrichment Activities, *Gifted, Language Arts, Music, Psychology, Reading, *Resource Guides, Social Sciences, Social Studies, Spelling, *Teaching Guides

Presented is a guide designed for teachers who have gifted students. Lessons designed for the gifted student are suggested. More than a dozen sample lessons are provided. Lesson titles include: Folk Songs, Geometry, Graphing Leaves, Creating a Nature Trail, The New Science of Ethology, and Original Research. In addition to the lessons, advice for teachers is presented. Topics discussed include: learning contracts, options to consider for elementary students with superior mathematical ability, learning-center stations, and curriculum modification for superior readers at the elementary school. (MK)

ED 183 363 **SE 029 535**
Jennings, Frederick Metro, Peter M.
Ecology for the Exceptional Child.
Rocky River Public Schools, Ohio.
Spons Agency—Ohio State Dept. of Education, Columbus. Div. of Research, Planning, and Evaluation.
Pub Date—Jan 76
Note—203p.; Contains occasional light and broken type
Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC09 Plus Postage.
Descriptors—Class Activities, Conservation (Environment), *Conservation Education, *Ecology, Environment, *Environmental Education, *Exceptional Child Education, Instructional Materials, Outdoor Education, Science Education, Secondary Education, *Special Education, Wildlife Management

The program contained in this guide is designed to be a student-centered approach to learning. Outlined are activities for large groups, small groups, or individualized study. Activities can be used with students of differing exceptionalities. Sufficient curriculum materials are provided for a continuous program over three years. Each activity unit provides a rationale statement, objectives, suggested activities, and detailed instructions for each activity. (Author/RE)

ED 184 873 **SE 030 534**
Bellman, Richard E. And Others
Project SOUL: Computer Training Program for High School Students from Disadvantaged Areas. Part I, General Report. Technical Report.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
Spons Agency—National Science Foundation, Washington, D.C.
Report NO.—USCEE-402-A
Pub Date—Apr 71
Grant—NSF-GJ-0981
Note—112p.; For related documents, see SE 030 535 and ED 180 765. Appendix K (Publicity - Newspaper Clippings) removed due to copyright restrictions.
Pub Type— Reports - Descriptive (141)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Compensatory Education, *Computer Oriented Programs, Computers, *Computer Science Education, Curriculum Development, *Disadvantaged Youth, Educationally Disadvantaged, Experimental Programs, *Program Descriptions, Programing, *Secondary Education, Secondary School Mathematics, Secondary School Science, Summer Programs
Identifiers—Project SOUL

This report presents a general description of the 1970 "Project SOUL" summer program. The computer training course, intended for disadvantaged high school students, provides both training for immediate jobs and fundamental mathematical and scientific training for students going on to college. Included in this document are a description of the selection of participants, the data processing program, the scientific programing course, and a project overview. (MK)

ED 184 874 **SE 030 535**
Woolever, James
Project SOUL: Computer Training Program for High School Students from Disadvantaged Areas. Part II, The Keypunch and Data Processing Courses. Technical Report.
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
Spons Agency—National Science Foundation, Washington, D.C.
Report NO.—USCEE-402-B
Pub Date—Apr 71
Grant—NSF-GJ-0981
Note—132p.; For related documents, see SE 030 534 and ED 180 765. Appendix I marginally legible.
Pub Type— Reports - Descriptive (141)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—Compensatory Education, *Computer Oriented Programs, Computers, *Computer Science Education, Data Processing, *Disadvantaged Youth, Educationally Disadvantaged, Educational Objectives, Experimental Programs, *Program Descriptions, Programing, *Secondary Education, Secondary School Mathematics, Secondary School Science, Summer Programs, Teaching Guides
Identifiers—Project SOUL

"Project SOUL" is a summer program in which disadvantaged high school students are given computer training. This section describes the content of the Keypunch and Data Processing Courses conducted in 1970. One or both of these descriptions include course objectives, course outline, teaching guide, and methods of instruction and evaluation. (MK)

ED 184 875 **SE 030 543**
Schatz, Dennis And Others
Marine Science Activities for Visually Impaired.
Pacific Science Center, Seattle, Wash.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date—[79]
Note—97p.
Available from—Pacific Science Center, 200 Second Ave. N., Seattle, WA 98109 (free while supply lasts).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—Class Activities, Disabilities, Elementary Education, Elementary School Science, *Environment, *Environmental Education, *Marine Biology, Natural Resources, *Oceanography, Outdoor Education, Science Activities, *Science Education, *Visual Impairments

These marine education materials are based on the approach that students learn best when given a multisensory experience. The activities are intended to develop such experiences for the visually impaired child. Activities are intended to supplement an upper-elementary science curriculum or be the basis of a unit on marine biology. The guide is organized into two sections: (1) the activity sets; and (2) background information for the sets. (RE)

ED 191 660 **SE 031 626**
Ricker, Kenneth S.
Teaching Biology to Visually Handicapped Students. Resource Manual.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—Jun 80
Grant—SPI-7803745-A01
Note—158p.; Photographs will not reproduce well.
Pub Type— Reports - Descriptive (141)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—*Biology, Higher Education, *Laboratory Procedures, *Low Vision Aids, Science Activities, Science Education, Science Instruction, *Science Materials, Secondary Education, *Visual Impairments

This resource manual presents numerous techniques for adapting science activities to the visually handicapped student, applicable to introductory biology courses in which microscopes are used extensively in the laboratory. Chapters include information on the following: alternative microscopic viewing techniques, physical models, tactile diagrams, measuring techniques, alternative activities and materials (genetics, bacteria, mapping chromosomes, mitotic indexing, blood typing, osmosis), and other techniques (mathematical problems, lab reports, tactile record sheets, safety considerations, sensors, Sewell embossing and swail dot inverter). An appendix lists sources of materials and equipment for the visually handicapped. (CS)

ED 196 721 **SE 033 907**
Thompson, Ben, Ed.
Science for the Handicapped: An Annotated Bibliography.
ERIC Clearinghouse for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—Dec 80
Contract—400-78-0004
Note—99p.
Available from—Information Reference Center (ERIC/IRC), The Ohio State Univ., 1200 Chambers Rd., 3rd Floor, Columbus, OH 43212 ($3.50).
Pub Type— Reference Materials (130) — Reference Materials - Bibliographies (131) — Information Analyses - ERIC Information Analysis Products (071)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—College Science, *Disabilities, Elementary School Science, Elementary Secondary Education, *Hearing Impairments, Higher Education, Multiple Disabilities, *Resource Materials, *Science Education, Secondary School Science, *Visual Impairments
Identifiers—*Science Education Research

This annotated bibliography provides sources for information on science education for the handicapped. Listings are provided of general references and also those dealing with research in the three areas of the visually impaired, the hearing impaired, and other handicapping conditions. (CS)

Various Subjects

ED 011 000 SE 000 752
THEORY INTO ACTION. IN SCIENCE CURRICULUM DEVELOPMENT.
National Science Teachers Asan., Washington, D.C.
Pub Date 64
Note—52p.
EDRS Price MF-$0.09 HC-$2.08
Descriptors—*CONCEPTUAL SCHEMES, *CURRICULUM DEVELOPMENT, *ELEMENTARY SCHOOL SCIENCE, *SCIENTIFIC LITERACY, *SCIENTIFIC METHODOLOGY, *SECONDARY SCHOOL SCIENCE, CONCEPT FORMATION, DISTRICT OF COLUMBIA, TEACHING METHODS.

A theoretical framework and guidelines for science curriculum development are presented in this volume. The booklet consists of three sections plus an appendix. In the first section a science educator proposes a plan for science teaching compatible with the nature of science, cultural changes, and the expanding body of knowledge. The choice of instructional materials for teaching conceptual schemes and scientific skills is discussed. The second section of the volume is a committee report containing a list of seven conceptual schemes of science and a list of five major constituents of the scientific process. Each listed item is discussed. Plans and suggestions for a local action program to foster curriculum development constitute the third section of the booklet. The essential components for a local action program are listed. Twelve guidelines for developing a coordinated K-12 program are also listed and discussed. The appendix includes the National Science Teachers Association position on curriculum development in science and a bibliography. This document is also available from the National Science Teachers Association, 1201 Sixteenth St., N.W., Washington, D.C. 20036, for $1.50. The stock number is 471-14282. (RS)

ED 011 507 SE 000 493
Corey, Arthur F. And Others.
EDUCATION AND THE SPIRIT OF SCIENCE.
National Education Asan., Washington, D.C.
Pub Date 66
Note—34p.
EDRS Price MF-$0.09 HC-$1.36
Descriptors—*EDUCATIONAL OBJECTIVES, *SCIENCE EDUCATION, DISTRICT OF COLUMBIA, EDUCATIONAL POLICIES COMMISSION, NATIONAL DEFENSE EDUCATION ACT, SOCIOECONOMIC INFLUENCES.

The Educational Policies Commission reported in its position paper that a major objective of our schools should be to develop the spirit of science in students. Such a spirit of rational inquiry should include such values as (1) a desire to know and understand, (2) questioning of all things, (3) search for data and their meaning, (4) demand for verification, (5) consideration of premises, and (6) consideration of consequences. These values can be learned in connection with many kinds of intellectual activity. Potential benefits to a society which places emphasis on these values include higher standards of living and greater personal freedom. Such a common system of values might provide the basis for strengthened international legal and political order, and promote international stability and progress. This document is also available from the National Education Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036, $1.25 for a clothbound edition and $0.35 for a paper bound edition. (AG)

ED 024 458 PS 001 327
Griffin, Louise
Big Questions and Little Children: Science and Head Start.
ERIC Clearinghouse on Early Childhood Education, Urbana, Ill.
Spons Agency—Office of Economic Opportunity, Washington, D.C.
Pub Date 68
Note—38p.
EDRS Price MF-$0.25 HC-$2.00
Descriptors—Bibliographies, Culturally Disadvantaged, *Curriculum Guides, Educational Objectives, Enrichment Activities, General Science, Lesson Plans, *Preschool Children, Preschool Curriculum, Preschool Programs, *Science Activities, *Science Education, Science Materials, *Science Programs
Identifiers—*Head Start

This resource pamphlet is intended to acquaint the Head Start teacher with the possibilities of teaching science in a preschool program for disadvantaged children. Introductory sections stress the importance of including science in a Head Start program, briefly indicate how to use the pamphlet, and suggest some things to seek and avoid. A section entitled "Some Things to Keep in Mind" presents objectives for a science program. These are (1) to use science experiences to develop language skills, (2) to provide opportunities for children to relate to adults, (3) to provide variety in the child's experiences, (4) to establish a sense of the order in the world, (5) to develop completion experiences, (6) to give the child a feeling of being able to solve problems, and (7) to diffuse elements acquired through science into the child's whole life. Suggestions for planning science activities are presented through three sample lesson plans. A final section lists readings for adults, books and records to use with children, and sources for filmstrips, films, books, and science materials. (DR)

ED 024 592 24 SE 005 191
Botticelli, Charles R.
Conceptual Schemes in Science: A Basis for Curriculum Development.
National Science Teachers Association, Washington, D.C.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No—BR-6-1745
Pub Date [66]
Contract—OEC-2-6-061745-1623
Note—130p.
EDRS Price MF-$0.75 HC-$6.60
Descriptors—Chemistry, Cognitive Processes, *Conceptual Schemes, *Curriculum Design, *Curriculum Development, Earth Science, *Elementary School Science, Physics, *Secondary School Science
Identifiers—National Science Teachers Association, US Office of Education

This is the National Science Teachers Association project report regarding curriculum development in science. The approach utilizes conceptual schemes as basic elements. The theoretical base for this approach is developed in detail, and the implications for the classroom teacher are carefully analyzed. Guidelines for implementing a curriculum development program are given which are directed toward action at the local level. The report is committed to a K-12 articulated program of curriculum development based on the concepts and processes of science. (GR)

ED 025 436 SE 006 033
Showalter, Victor
New Directions for Science Curriculum Development.
Educational Research Council of America, Cleveland, Ohio.
Pub Date 14 Jun 68
Note—26p.
EDRS Price MF-$0.25 HC-$1.40
Descriptors—Bibliographies, *Curriculum Development, *Elementary School Science, General Education, Instruction, *Models, Objectives, *Scientific Literacy, *Secondary School Science

Proposed is an organizational plan for a K-12 science curriculum. The paper is organized into three parts. Part I proposes certain general objectives of instruction as a framework on which a K-12 science curriculum is to be built. The concepts of general education and scientific literacy are discussed in detail. Part II considers the "forces" tending to establish a unified or interdisciplinary structure for science in education. Part III deals with a model that attempts to relate the various elements of curriculum. The model is based on the premise that unified science is a valid and useful concept. The fundamental ideas or "conceptual schemes" of science are considered in the development of this model. A bibliography is appended. (BC)

ED 028 101 SE 006 570
Eiss, Albert F. Harbeck, Mary Blatt
Behavioral Objectives in the Affective Domain.
National Science Supervisors Association, Washington, D.C.; National Science Teachers Association, Washington, D.C.
Pub Date 69
Note—49p.
Available from—NEA Publications Sales, 1201 Sixteenth St., N.W., Washington, D.C. 20036 ($2.00)
EDRS Price MF-$0.25 HC Not Available from EDRS.
Descriptors—Affective Behavior, *Attitudes, *Behavioral Objectives, College Science, Elementary School Science, *Evaluation, Motivation, *Science Education, Scientific Attitudes, Scientific Enterprise, Scientific Literacy, Secondary School Science, *Student Interests
Identifiers—National Science Supervisors Association

This booklet investigates the problems of evaluating the outcomes of science in general education and is directed specifically to educational objectives in the affective domain. Some insights are presented into the way the affective educational objectives of Krathwohl may be written in behavioral terms. The interrelationship of the affective, cognitive, and psychomotor domains is outlined, and the need for behavioral objectives in science is explained. The affective domain receives special treatment in terms of values and value systems, attitudes, interests, and motivation. Indicator behaviors for affective goals are presented along with a scheme for evaluating affective outcomes. Useful appendices include some examples of (1) affective goals in behavioral terms, (2) test items in the affective domain, and (3) evaluation instruments. (GR)

ED 034 697 SE 007 746
Brown, Billye W. Brown, Walter R.
Science Teaching and the Law.
National Science Teachers Association, Washington, D.C.
Pub Date 69
Note—94p.
Available from—NEA Publications Sales Section, 1201 Sixteenth Street, N.W., Washington D.C. 20036 ($4.00).
EDRS Price MF-$0.50 HC Not Available from EDRS.
Descriptors—Accident Prevention, Bibliographies, *Curriculum, Educational Legislation, *Legal Responsibility, *Safety, *Science Teachers

This book aims to inform science teachers of their legal rights and responsibilities. The roles of various federal, state and local authorities in educational legislation are described. The teacher's liability for student safety and for implementing the curriculum as prescribed by state and local regulation is defined, and suggestions are made for ensuring student safety. Guidelines are given for working with the community and for accounting for funds and equipment. Help available to the teacher who finds himself in trouble is described, and suggestions are made for positive action that may be taken to modify laws and regulations. The appendix includes bibliographies on teacher liability, narcotics and alcohol education, care of living animals, radiation safety, eye protection, sex education, model rocketry, and general health and safety. Sample policy statements and safety regulations are included. (EB)

ED 036 428 SE 007 741
Koran, John J., Jr. And Others
How to Use Behavioral Objectives in Science Instruction.
National Science Teachers Association, Washington, D.C.
Pub Date 69
Note—12p.
Available from—National Education Association, 1201 16th Street, N.W., Washington, D. C., 20036 (Stock Number 471-14596, $0.35)
EDRS Price MF-$0.25 HC Not Available from EDRS.
Descriptors—Affective Behavior, *Behavioral Objectives, Cognitive Objectives, *Educational Objectives, *Elementary School Science, Performance Criteria, Psychomotor Objectives, *Secondary School Science

Behavioral objectives serve several functions: (1) identify expected learner outcomes for a given lesson or unit of study, (2) provide a basis for selection and organization of materials and experiences for effective learning, (3) provide a systematic means for devising ways of evaluating student performance and (4) provide a means to identify those behaviors that children are already exhibiting prior to presenting a lesson designed to produce behaviors. When writing a behavioral objective, one must use a specialized verb limited to few interpretations. It is important to describe the situation in which the desired behavior is to be observed. The minimal acceptable performance for a given behavioral objective must be identified. Behavioral objectives can be written for different learning outcomes: (1) cognitive learning, (2) affective learning, and (3) psychomotor learning. (BR)

ED 038 726 24 CG 005 384
Klopfer, Leopold E.
Student Behavior and Science Content Categories and Subcategories for a Science Program.
Pittsburgh Univ., Pa. Learning Research and Development Center.
Spons Agency—Office of Education (DHEW), Washington, D.C. Bureau of Research.
Report No—WP-54
Bureau No—BR-5-0253
Pub Date Jan 70
Note—67p.
EDRS Price MF-$0.50 HC-$3.45
Descriptors—*Behavioral Objectives, Charts, *Classification, Culture, *Science Curriculum, Science Materials, Science Programs, Scientific Methodology, Student Attitudes, *Student Behavior.

This paper presents a two dimensional chart of student behavior and subject matter content for facilitating the development of the Individually Prescribed Instruction (IPI) science curriculum, or any science curriculum. Within this framework, behavioral objectives are formulated, science subject matter content is selected, student learning experiences are designed, and evaluation procedures are planned. Incorporated in the schema is a unique delineation of student behaviors with respect to the processes of scientific inquiry and these are integrated with categories of the student's cognitive behavior as it pertains to science learning. Included also in the behaviors dimension are the student's attitudes and interests and his orientation to the relationships between science and other aspects of culture. In the content dimension, the discussion includes new explications of the nature of scientific inquiry and the social aspects of science. (Author/EK)

ED 046 215 EM 008 630
Goldman, Katherine J., Ed.
Opportunities for Extending Museum Contributions to Pre-College Science Education.
Smithsonian Institution, Washington, D.C.
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date 3 Aug 70
Note—182p.; Summary Report of a National Science Foundation-supported conference, Belmont Conference Center, January 26-27, 1970
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Adult Education, Children, Curriculum Development, Elementary Education, *Exhibits, Instructional Media, *Instructional Trips, Mobile Laboratories, *Museums Planetariums, *Science Education, Secondary Education, Social Sciences, Surveys
Identifiers—Educational Programing of Cultural Heritage, EPOCH

Papers were given at a conference sponsored by the National Science Foundation on present and future use of the museum as an educational resource. Science education, media use, museum-community relationships, and museum-school relationships engaged the attention of the speakers. The educational programs of particular museums were reported on by members of their staff. An annotated bibliography is given. The appendices contain suggestions on the possible functions of a science museum and statistical information on museums and precollege science education. (MF)

ED 059 900 SE 013 400
Walbesser, Henry H. Eisenberg, Theodore A.
A Review of Research on Behavioral Objectives and Learning Hierarchies.
ERIC Information Analysis Center for Science Education, Columbus, Ohio.
Pub Date Jan 72
Note—82p.
Available from—Ohio State University, Center for Science and Mathematics Education, 248 Arps Hall, Columbus, Ohio 43210 ($1.25 plus $.25 handling)
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Behavioral Objectives, Instruction, *Learning, *Mathematics Education, Psychometrics, *Research Reviews (Publications), *Science Education
Identifiers—Learning Hierarchies

In the first part of this paper, the purposes of behavioral objectives are outlined; research is then summarized, including the influence of knowledge of the behavioral objectives on a learner's performance, teacher recognition of behavioral objectives, and student attitudes to behavioral objectives. The second part presents a summary of methods of constructing learning hierarchies. The research topics outlined include the structure and efficiency of expert versus student generated hierarchies, relationships between performances on adjacent levels of a hierarchy, and the psychometrics of learning hierarchies. Each part of this paper contains a table of the research hypotheses investigated, with a listing of supporting and non-supporting experiments reported. Although most of the research reviewed refers to mathematics and science, studies in other areas are also included. (MM)

ED 063 162 SE 013 807
Budde, Duane
Mounds View Environmental Education Project, Report #1.
Pub Date 71
Note—58p.; Prepared for the National Science Teachers Association Meeting, Washington, D.C., 1971
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Curriculum Development, *Curriculum Guides, *Environmental Education, *Interdisciplinary Approach, Language Arts, Learning Activities, Sciences, *Secondary Grades, Social Studies

Prepared for the 1971 National Science Teachers Association (NSTA) Annual Meeting, this collection of ideas, activities, and unit plans from the Mounds View Environmental Education Project would be useful for junior and senior high school teachers and curriculum planners. Content includes: (1) a senior high course outline and daily lesson plans for "Environmental Problems and the Future of Man," dealing with population explosion, food supply, natural resources, water and air pollution, and pesticides; (2) units for junior high environmental studies—soil conservation, animal poetry, pollution solution/communication, you as an environmentalist, and air pollution; (3) environmental activities particularly successful in the classroom; (4) a description of high school science courses relevant to the natural environment; (5) a junior high model for curriculum implementation; (6) suggestions on how the environmental education curriculum can be integrated with the social studies curriculum in the junior high school; (7) ideas for an interdisciplinary approach to the environmental education curriculum in grades 10-12; (8) various evaluation forms for faculty reaction, district assessment, and feedback; and (9) suggested proposals for environmental study sites. An interdisciplinary approach, primarily stressing science, social studies, and language arts is evident throughout the work. (BL)

ED 068 325 SE 014 827
Guidelines for Curriculum Development—Environmental Education K-12. Part I, Concepts, Ideas, Objectives and Principles.
Broward County School Board, Fort Lauderdale, Fla.
Spons Agency—Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
Pub Date May 72
Note—33p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Curriculum Development, Ecology, Elementary Grades, *Environmental Education, *Fundamental Concepts, *Guidelines, Problems, Secondary Grades
Identifiers—Elementary Secondary Education Act Title III, ESEA Title III

Research into the problems, causes, and possible solutions to the environmental crisis confronting mankind led to the development of these guidelines for curriculum development by the Interdisciplinary Environmental Education Project of Broward County, Florida. The purpose of the research was to determine the role that could be played by the educational community and to identify those aspects of the problem that should be given major emphasis. This booklet contains Part I of a three-part publication. It is a compilation of the basic concepts upon which the entire program is based. It also includes the major environmental problems with which we are or will be confronted, the alternatives, and the possible solutions to these problems. It is sufficiently general, in scope and content, to be of value to those having responsibility for curriculum development. Parts II and III deal with classroom/outdoor activities and community resources and involvement. This work was prepared under an ESEA Title III contract. (BL)

ED 072 042 SP 007 394
Junior High School Science: A Manual for Teachers. A Search for Structure. Grade 7.
Baltimore County Public Schools, Towson, Md.
Pub Date 69
Note—496p.
Available from—Board of Education of Baltimore County, Towson, Md. 21204 ($15.00) Per Copy
EDRS Price MF-$0.65 HC Not Available from EDRS.
Descriptors—*Curriculum Design, *Curriculum Guides, Grade 7, *Junior High Schools, *Science Curriculum, *Science Teachers

GRADES OR AGES: Grade 7. SUBJECT MATTER: Science. ORGANIZATION AND PHYSICAL APPEARANCE: The introduction describes the development of the junior high school science program. The main text is divided into three phases: Processes and Skills, Developing a Model of Matter, and Human Structure and Function. Phase I contains two subcategories: Rocks and Minerals, and Insects. The manual is lithographed and spiral bound with a hard cover. OBJECTIVES AND ACTIVITIES: Objectives are given before each section and activities are found under Teaching Suggestions. INSTRUCTIONAL MATERIALS: The text contains references for the teacher in each section. Four student manuals on rocks and minerals, insects, a model of matter, and living systems are included. STUDENT ASSESSMENT: Sample assessment tasks are included in the Teaching Suggestions. (BRB)

ED 074 202 UD 013 448
Handbook on Performance Objectives: Title I, Elementary and Secondary Education Act of 1965.
Office of Education (DHEW), Washington, D.C. Div. of Compensatory Education.
Report No—DHEW-OE-73-07103
Pub Date 73
Note—42p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Academic Performance, Compensatory Education Programs, *Educational Objectives, Federal Programs, Performance Criteria, Performance Factors, Performance Specifications, Program Design, Program Development, *Program Evaluation, Program Guides, Program Planning, *Program Proposals, Writing Skills
Identifiers—*Elementary Secondary Education Act Title I, ESEA Title I

The Division of Compensatory Education, Program Support Branch of the Bureau of Elementary and Secondary Education, Department of Health, Education, and Welfare, Office of Education, has prepared this handbook to assist in developing skills in performance objective development for Title I programs. This handbook develops the concepts and skills necessary to analyze and write performance objectives. The five chapters of this hand book discuss legal requirements, program development processes, target populations, performance objectives, and end-product evaluation and performance objectives. An Appendix includes exercises pertinent to each chapter, a schematic representation of the program development process, and an outline of the text for writing performance objectives. Exercises and examples related to Title I are included in the handbook, using techniques that provide for continuous self-evaluation of the skills of performance objective writing. Use of this handbook does not insure that project personnel will become experts, but they are expected to understand performance objectives sufficiently to write them in project applications. (Author/JM)

ED 077 776 SE 016 442
Educational Objectives.
Hanover School System, Mass.
Pub Date 1 May 73
Note—49p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—*Course Objectives, *Educational Objectives, *Elementary Grades, English Education, Health Education, Mathematics Education, Pamphlets, Science Education, *Secondary Grades
Identifiers—*Hanover School System

This statement of educational objectives was produced during the 1972-73 school year by the cooperative efforts of the teaching staff of the Hanover School System, Hanover, Massachusetts. The objectives were formulated by teachers working as a total group and in 13 committees: Health, Business, Music, Vocational Education, Reading, Mathematics, Science, English, Library, Social Studies, Art, Foreign Languages, and Physical Education. The objectives are categorized and stated on two levels. First Level Objectives are broad statements of expected or desired outcomes and provide an orientation as well as a philosophical guide to the main emphasis of the total educational program. Second Level Objectives are more immediately obtainable than First Level Objectives, and are statements of roads to travel rather than terminal points. These objectives are arranged according to the specific subject matter areas. Third Level Objectives (behavioral objectives), which state expected student behavior in measurable terms, are not included in this publication. (JR)

ED 079 054 SE 015 821
Oickle, Eileen M., Ed.
Unified Science Approach K-12, Proficiency Levels 1-6.
Anne Arundel County Board of Education, Annapolis, Md.
Pub Date Sep 72
Note—70p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biological Sciences, *Curriculum Guides, *Educational Objectives, Elementary School Science, *Instructional Materials, Kindergarten, Physical Sciences, *Science Education, Secondary School Science, *Unified Studies Programs
Identifiers—Unified Science

Presented are first-revision materials of the K-12 unified science program implemented in the public schools of Anne Arundel County, Maryland. Detailed descriptions are given of the roles of students and teachers, purposes of bibliography, major concepts in unified science, processes of inquiry, scheme and model for scientific literacy, and program rationale, design, and strategies. The first six proficiency level statements are provided together with 50 proficiency level objectives. Each objective is further analyzed into a number of educational objective statements. The content is related to such aspects as plants, animals, food chain, seed growth, solar system, matter, space, forces, heat, light, photosynthesis, pollution, electric circuits, chemical reactions, magnets, energy, friction, and levers and inclined planes. Included are a list of elementary projects, kits, and materials and bibliographies of selected elementary, secondary, and professional readings. (CC)

ED 079 055 SE 015 822
Oickle, Eileen M., Ed.
Unified Science Approach K-12, Proficiency Levels 7-12.
Anne Arundel County Board of Education, Annapolis, Md.
Pub Date Sep 72
Note—87p.
EDRS Price MF-$0.65 HC-$3.29
Descriptors—Biological Sciences, *Curriculum Guides, *Educational Objectives, Elementary School Science, *Instructional Materials, Kinetic Molecular Theory, Physical Sciences, *Science Education, Secondary School Science, *Unified Studies Programs
Identifiers—Unified Science

Presented is the second part of the K-12 unified science materials used in the public schools of Anne Arundel County, Maryland. Detailed descriptions are made of the roles of students and teachers, purposes of the bibliography, major concepts in unified science, processes of inquiry, a scheme and model for scientific literacy, and program rationale, design, and strategies. Proficiency levels 7-12 are incorporated together with 65 proficiency level objectives. Each objective is further analyzed into a number of educational objective statements. The content is related to such aspects as kinetic molecular theory, chemical changes, respiratory systems, growth and reproduction, cell structures, mammals, lithosphere, hydrosphere, atmosphere, biosphere, force of gravity, weather changes, human body, adaptation of living theings to their environment, interactions between living and non-living things, and systems interactions within the universe. Included are a list of elementary projects, kits, and materials and bibliographies of selected elementary, secondary, and professional readings. (CC)

ED 079 056 SE 015 823
Oickle, Eileen M., Ed.
Unified Science Approach K-12, Proficiency Levels 13-21 and Semester Courses.
Anne Arundel County Board of Education, Annapolis, Md.
Pub Date Sep 72
Note—132p.
EDRS Price MF-$0.65 HC-$6.58
Descriptors—Biological Sciences, Course Descriptions, *Curriculum Guides, *Educational Objectives, Elementary School Science, *Instructional Materials, Physical Sciences, *Science Education, Secondary School Science, *Unified Studies Programs
Identifiers—Unified Science

Presented is the third part of the K-12 unified science materials used in the public schools of Anne Arundel County, Maryland. Detailed descriptions are presented for the roles of students and teachers, purposes of bibliography, major concepts in unified science, processes of inquiry, scheme and model for scientific literacy, and program rationale, design, and strategies. Proficiency levels 13-21 are incorporated together with 75 proficiency level objectives. Each objective is analyzed into a number of educational objective statements. Three sequences of course learning are further provided for students after completion of the work of proficiency levels 1-21. Course names, rationale for course study, unit descriptions, and prerequistes are entered in the descriptive sheet of each course offering. The course content, partly selected from other science curriculum improvement projects, is related to the fields of physical sciences, chemistry, biological sciences, physics, geology, oceanography, zoology, environmental studies, geomorphology, and botany. Applications of scientific principles are stressed. Included are a list of elementary projects, kits, and materials and bibliographies of selected elementary, secondary, and professional readings. (CC)

ED 089 979 SE 017 476
Science Education: Student Terminal Goals, Program Goals, and Behavioral Objectives.
Mesa Public Schools, Ariz.
Pub Date [73]
Note—32p.
EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE
Descriptors—Affective Objectives, *Behavioral Objectives, Biological Sciences, Cognitive Objectives, Earth Science, *Elementary School Science, Performance Criteria, Physical Sciences, Psychomotor Objectives, *Secondary School Science

This booklet contains a compilation of student terminal goals, program goals, and behavioral objectives for science education developed for the public schools of Mesa, Arizona. The program goals and behavioral objectives span the science curriculum from grade one through senior high school level for each of the four terminal goals which are (1) know fundamental facts and principles of science, (2) possess the abilities and skills needed to engage in the processes of science, (3) understand the investigative nature of science, and (4) have appreciation of scientists, science, and the consequences of science. (PEB)

ED 091 173 SE 017 512
Science Safety Grades K-12. Curriculum Bulletin, 1971-72, Series, No. 7
New York City Board of Education, Brooklyn, N.Y. Bureau of Curriculum Development.
Pub Date 72
Note—55p.
Available from—New York Board of Education, Publications Sales Office, 110 Livingston Street, Brooklyn, New York 11201 ($1.00)

EDRS Price MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE

Descriptors—*Accident Prevention, Bulletins, Elementary School Science, Health, *Safety, *Safety Education, *Science Education, Secondary School Science

Identifiers—New York City

This bulletin includes general directions for assistant principals, science teachers, laboratory specialists, and pupils pertaining to science laboratory safety. A list of hazards and precautions is presented. Also included is a list of chemicals considered dangerous by the New York Fire Department. (DJH)

ED 093 687 SE 018 008

Seaford School District Science Guide.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 73

Note—100p.

Available from—Mr. John F. Reiher, State Supervisor of Science and Environmental Education, Department of Public Instruction, John G. Townsend Building, Dover, Delaware 19901 ($2.00, make checks payable to the Del Mod System)

EDRS Price MF-$0.75 HC-$4.20 PLUS POSTAGE

Descriptors—*Curriculum Guides, *Elementary School Science, General Science, Instruction, *Instructional Materials, *Junior High School Students, *Kindergarten, Psychomotor Skills, Science Education, Scientific Concepts, Teaching Guides

Identifiers—*Del Mod System

This monography presents the concepts to be presented, the psychomotor skills through to pertain to all the concepts, the process skills required, and the values and attitudes hoped to be developed for a science curriculum, K through 8. A list of suggested field trips accompanies each syllabus. At the kindergarten through grade 6 levels, scientific concepts are presented concerning Animal and Plant Biology, Health and Nutrition, Earth and Space Science, Matter and Energy, as well as some general concepts of Measurements. A more detailed course outline is presented for levels seven and eight. In level seven, greater emphasis is placed on such concepts as Evolution, Genetics and Interdependency, in the biological sciences and Forms of Energy, and Simple Mechanics for the physical sciences. Attention is given to careers in science, great names in science and the measurement system in both levels seven and eight. The psychomotor skills, process skills and affective skills suggested are also directed toward both levels. Earth and Space science, including Oceanography, is developed as level eight. (EB)

ED 096 113 SE 018 007

Banks, Dennis E. And Others

Indian River School District Science Curriculum Guidelines.

Delaware State Dept. of Public Instruction, Dover.; Del Mod System, Dover, Del.

Spons Agency—National Science Foundation, Washington, D.C.

Report No—NSF-GW-6703

Pub Date 30 Jun 73

Note—33p.

EDRS Price MF-$0.75 HC-$1.85 PLUS POSTAGE

Descriptors—Biology, Chemistry, *Curriculum Guides, Earth Science, Grade 7, Grade 8, Grade 9, Instruction, *Instructional Materials, *Junior High School Students, Physical Sciences, Physics, Science Education, *Secondary School Science, Teaching Guides

Identifiers—*Del Mod System

This monograph includes guidelines for science courses in grades seven, eight, and nine, and for biology, chemistry and physics. Seventh grade Environmental Life Science is lab-oriented and based on a variety of student experiences. Course objectives are presented as well as the course outline. A multitext approach, with a suggested textbook list, is organized on reading ability level. The Earth Science Course, grade eight, focuses the attention of the student on the physical world in which he lives. Instructional materials suggested include films, filmstrips, and reference books and publications. The ninth grade curriculum exposes students to many physical science areas as well as a basic background for physics and chemistry students. A Materials List suggests texts and experiments that could be incorporated into the program. The major objectives of Biology I, the course content and supplementary materials are built around the BSCS green and yellow versions, an ecological approach. Supplementary materials include lab exercises, field exercises and films. Included in the chemistry curriculum are plans for an academic chemistry section and a terminal science section. Cotton and Lynch's "CHEMISTRY: An Investigative Approach" is used for academic students and Metcalfe, Williams, and Castka's MODERN CHEMISTRY, for the non-academic course. The textbook "Modern Physics" by Del. Metcalfe and Williams is used in the physics course. (EB)

ED 100 057 EA 006 678

Statewide Educational Objectives.

Delaware State Dept. of Public Instruction, Dover. Div. of Research, Planning, and Evaluation.

Pub Date Jan 75

Note—143p.

EDRS Price MF-$0.75 HC-$6.60 PLUS POSTAGE

Descriptors—Communication Skills, Cooperative Planning, *Educational Accountability, Educational Coordination, *Educational Objectives, *Educational Planning, Educational Policy, Educational Strategies, Elementary Education, Junior High Schools, Mathematics Instruction, Mental Health, Natural Sciences, Physical Health, Reading Instruction, Social Studies, State Boards of Education, State Departments of Education, *State Programs

Identifiers—*Delaware

This report presents specific educational objectives for grades K-8 in Delaware's public schools. The objectives evolved from nine major goals for education adopted by the State board of education in the spring of 1972. Specific objectives for each subject area were developed by task forces made up of teachers, supervisors, and administrators from throughout the State working in conjunction with Delaware Department of Public Instruction personnel. An introductory section discusses the Delaware Educational Accountability System. Separate sections describe objectives for each grade in the areas of communication skills, reading, natural science, mathematics, social studies, and physical and mental health. (JG)

ED 100 061 95 EA 006 683

Phillips, Jarvis S. Chappelle, William D.

Catalog of Promising Educational Programs and Practices 1972-1973.

Automated Services, Inc., Washington, D.C.

Spons Agency—National Inst. of Education (DHEW), Washington, D.C. Office of Dissemination and Resources.

Pub Date [74]

Contract—OEC-0-72-4353

Note—349p.

EDRS Price MF-$0.75 HC-$16.20 PLUS POSTAGE

Descriptors—Art, Business Education, *Curriculum Design, *Curriculum Development, Educational Administration, Educational Change, Educational Practice, *Elementary Education, Elementary Secondary Education, Handicapped Students, Industrial Arts, *Instructional Programs, Language Arts, Mathematics, Music, Natural Sciences, *Secondary Education, Social Studies

The abstracts in this collection describe selected programs operating in public schools during 1972-73. Locally devised and implemented, these programs for grades kindergarten through twelve were selected for their probable general interest and use. The subject areas included are administrative services, art, business, language arts, general elementary and secondary education, handicapped students, industrial arts, mathematics, music, natural sciences, and social studies. A standard format presents an overview, the target population, major purpose, objectives, activities, evaluation strategy and findings, cost, and contact person for each program. (Author/DW)

ED 104 645 SE 018 502

Cherem, Gabriel J. And Others

The Beginnings of a Nature Center.

Wisconsin Univ., Stevens Point. Coll. of Natural Resources.

Pub Date 74

Note—162p.

EDRS Price MF-$0.76 HC-$8.24 PLUS POSTAGE

Descriptors—Conservation Education, Educational Programs, *Environmental Education, Natural Resources, *Nature Centers, Outdoor Education, *Program Planning, *Resource Centers, *Science Education

This guide is a comprehensive interpretive plan for the development of a nature center. Although the plan centers on a proposed nature center, the ideas included in the guide can be applied to other situations. The guide deals with all aspects of planning and is divided into seven chapters. Chapter 1, Visitorship, looks at the people who attend nature centers. Chapter 2, Exterior Concept, includes such topics as plans for expansion of the school house, nature trails, planting schemes, exterior flow, and gardens. The Interior Concept, Chapter 3, looks at flow patterns, placement of interior facilities, visitor view, and other interior concerns. Chapter 4, Aura and Displays, examines possible displays, such as a bee hive, forest alcove, aquarium, and others. Chapter 5 deals with the justification and planning of audiovisuals and publications for the center. Chapter 6, Program Operations, discusses such needs as philosophy and objectives, funding, staffing, and maintenance. The Inventory, Chapter 7, provides an inventory of the topography, archaelogy, biotic communities and others. Most chapters contain illustrations, maps, and diagrams. Visitor centers in Wisconsin, sample scripts for slide shows, and a plant and bird list are included in the appendices. (TK)

ED 108 943 SE 019 231

Program of Studies, Science, K-12.

Fairfax County Schools, Va.

Pub Date 74

Note—99p.

EDRS Price MF-$0.76 HC-$4.43 PLUS POSTAGE

Descriptors—*Course Content, Curriculum, *Elementary School Science, Elementary Secondary Education, *Program Descriptions, *Science Curriculum, Science Education, Science Programs, *Secondary School Science

Identifiers—Fairfax County Schools, Virginia

Presented is one of a series of publications, Resources in Education, related to the Science Program of the Fairfax County Public Schools, 1974. A program description for K through 12 is presented to include the major goals of science education. A program description of each level is presented and Primary, Middle Elementary and Upper Elementary science units are included. The program of studies for grades K-6 is presented in a separate section, Section B, and that for grades 7-12 is under separate cover. A seventh grade Environmental Science course is outlined. The program includes Introductory Physical Science (IPS), Earth Science (ESCP), Biology (BSCS), Special Materials Biology, CHEM Study and both PSSC and Project Physics. Biology II and Advanced Chemistry are also included. (EB)

ED 116 181 CS 002 346

Thelen, Judith

Improving Reading in Science. Reading Aids Series.

International Reading Association, Newark, Del.

Pub Date 76

Note—60p.; Some pages may not reproduce due to small type

Available from—International Reading Association, 800 Barksdale Road, Newark, Delaware 19711 (Order No. 217, $3.50 non-member, $2.50 member)

EDRS Price MF-$0.76 HC-$3.32 Plus Postage

Descriptors—*Content Reading, Reading Comprehension, *Reading Improvement, *Reading Instruction, Science Courses, *Science Instruction, Sciences, Secondary Education, Thought

Processes

The material in this monograph is based on the idea that science content and the reading and reasoning processes for learning may be taught simultaneously in the science classroom. Topics of the six chapters are: distinguishing between content and process, developmental and functional reading, diagnosis in teaching science, preparatory activities for teaching science, the use of guided material in teaching science, the reinforcement of vocabulary and comprehension in teaching science, and evaluation in the teaching of science. Two appendixes include an informal study skills inventory on a physical science textbook and an extensive statement to students about learning to think. (JM)

ED 118 758 95 CE 006 248
[Digest of Resource Activities for Career Education]. Pilot Occupational Education Programs for Small Rural and Suburban Arkansas Schools in Grades One Through Twelve.
Arkansas State Dept. of Education, Little Rock. Div. of Vocational, Technical and Adult Education.
Spons Agency—Bureau of Adult, Vocational, and Technical Education (DHEW/OE), Washington, D.C.
Bureau No—V061032
Pub Date Sep 73
Grant—OEG-0-70-5189(361)
Note—152p.
EDRS Price MF-$0.83 HC-$8.69 Plus Postage
Descriptors—Career Awareness, *Career Education, Career Exploration, Curriculum Development, *Elementary Secondary Education, *Integrated Curriculum, *Learning Activities, Special Education, *Teacher Developed Materials

One hundred forty-two activities in career education which can be incorporated into the regular K-12 curriculum are presented in the document. Ideas for the activities were obtained from teachers in nine Arkansas schools involved in an exemplary career education project. The activities are grouped as follows: separately by grade level for K-9; special education; vocational education; and separately by topic for high school English, social studies, science, math, special education, and electives. Each activity includes information on its source, purpose, materials required, lesson capsule, and observations from teachers who have used the activities. (EC)

ED 120 018 SE 020 520
Lawson, Anton E. And Others
How's Your I.Q. (Inquiry Quotient)?
Pub Date Sep 74
Note—24p.
EDRS Price MF-$0.83 HC-$1.67 Plus Postage
Descriptors—*Evaluation, *Inquiry Training, Instruction, *Instrumentation, *Questioning Techniques, Questionnaires, *Science Education, Teacher Behavior, Teaching Methods, Teaching Techniques

The purpose of this paper is to provide a set of criteria within a format that teachers, student teachers, and supervisors can use to better understand what inquiry is and how to evaluate the extent to which it is being incorporated into classroom activities. The evaluative criteria are organized into an instrument and are divided into the following categories: the lesson, student behavior, teacher behavior, and questioning techniques. Twenty-five criteria are included in the instrument. Properly used, the instrument should assist the user in determining where he is now and how, with continued application of the criteria, he can become a more inquiry-oriented individual. The instrument can be used to evaluate one lesson or a series of lessons. (MLH)

ED 123 564 CS 002 639
Blake, Sylvia, Ed.
Teaching Reading Skills Through Social Studies and Science Materials.
New York City Board of Education, Brooklyn, N.Y. Div. of High Schools.
Pub Date 75
Note—33p.
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Content Reading, Elementary Secondary Education, Learning Laboratories, *Reading Instruction, *Reading Skills, Sciences, Social Sciences, *Teaching Methods

The purpose of this manual is to assist the reading teacher toward a fuller understanding of the processes and procedures applicable to the teaching of reading using social studies and science materials in the skills lab. For each of the two subject areas, the manual provides an overview, a list of teaching techniques for the various reading skills, and model lessons. An appendix indicates reading materials (with level) suitable for both subjects, and a brief bibliography lists references useful to teachers in organizing and integrating basic skills practices with content area approaches. (JM)

ED 126 891 95 IR 003 805
Coombs, Don H., Comp.
Simulation and Gaming: The Best of ERIC.
Stanford Univ., Calif. ERIC Clearinghouse on Information Resources.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date Aug 76
Contract—NIE-C-74-0027
Note—28p.
Available from—Box E, School of Education, Stanford University, Stanford, California 94305 ($2.25, Check made payable to "Box E" must accompany order)
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Affective Objectives, *Annotated Bibliographies, Case Studies, Computer Assisted Instruction, Decision Making, Educational Innovation, *Games, Game Theory, Information Sources, *Instructional Media, Learning Processes, Management Games, Media Research, Problem Solving, *Simulation, Teaching Techniques

Most of the 101 citations included in this annotated bibliography on simulation and gaming were derived from a search of the Educational Resources Information Center (ERIC) indexes. Entries were published between 1972 and 1975. The bibliography is divided into nine sections: theory and research; social studies materials; environment, land use, and planning; language, communication, and reading; business and economics; political science and law; vocational education; science and mathematics; and miscellaneous. Included is an introduction giving a philosophy of simulation/gaming and listing sources of further information. (CH/PF)

ED 128 244 SO 009 312
McKinney, William M.
Geography via Use of the Globe: Do It This Way, 5.
National Council for Geographic Education.
Pub Date 65
Note—26p.; For related documents, see ED 034 434 and SO 009 309-314
Available from—NCGE Central Office, 115 North Marion Street, Oak Park, Illinois 60301 ($1.00)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Earth Science, Elementary Secondary Education, Geographic Concepts, Geographic Location, Geography, *Geography Instruction, Higher Education, *Instructional Aids, Light, Mathematical Applications, Physical Geography, Physical Sciences, Relativity, Social Studies, *Space, Space Orientation, *Time
Identifiers—*Globes

In order to visualize relationships of space for teaching mathematical geography, this booklet shows how the globe may be used as a model of the earth in space. Its purpose is to stimulate the teaching of mathematical principles in secondary-school geography and earth science through a survey of basic principles of global usage. The introduction on using the globe discusses what it is, its advantages, its limitations, types of globes, and types of mountings. A discussion of the lines on a globe includes number and spacing of grid lines, parallels of latitude, meridians of longitude, direction in latitude and longitude, finding locations on a globe, and the great and small circles. How the earth is illuminated by sunlight involves its position in space. The discussion about illumination covers artificial illumination of the globe, summer solstice, winter solstice, equinoxes, length of day and night, subsolar point, tropic lines, natural illumination, sunrise and sunset, and location of the subsolar point. The concept of time is presented in relation to light and space by describing earth as a timepiece, noon and the meridian, equation of time, analemma, time and longitude, standard time, effect of repeated time changes, international date line, and time changes on the globe. (ND)

ED 128 245 SO 009 313
Richason, Benjamin F., Jr. Guell, Carl E.
Geography via Aerial Field Trips: Do It This Way, 6.
National Council for Geographic Education.
Pub Date 65
Note—25p.; For related documents, see ED 034 434 and SO 009 309-314
Available from—NCGE Central Office, 115 North Marion Street, Oak Park, Illinois 60301 ($1.00)
EDRS Price MF-$0.83 Plus Postage. HC Not Available from EDRS.
Descriptors—*Airborne Field Trips, Elementary Secondary Education, Field Trips, Geographic Regions, Geography, *Geography Instruction, Higher Education, Human Geography, Land Use, Outdoor Education, *Physical Geography, Physical Sciences, Program Planning, Teaching Guides, *Teaching Methods

To provide guidance for geography teachers, this booklet presents information on how to plan and execute aerial field trips. The aerial field trip can be employed as an effective visual aid technique in the teaching of geography, especially for presenting earth generalizations and interrelationships. The benefits of an aerial field trip are studying a region from a high vantage point for a total view, surveying an extensive area within a short period of time, and experiencing air topography and currents. Elements to consider when planning the aerial field trip include selecting the features to be viewed, determining the flight route, length of the field trip, selecting the type of aircraft to use, how many aircraft to use, altitude at which to fly, when to schedule the trip, cost of the aerial field trip, and preparation of flight map and log. The booklet offers short sections containing ideas about preflight classes and briefing and about postflight interrogation and review. Twenty-five photographs illustrating different aerial views of land conclude the booklet. (ND)

ED 136 444 EA 009 388
Maryland School Science Facilities Guidelines.
Maryland State Dept. of Education, Baltimore. Div. of Instruction.; Maryland State Interagency Committee on School Construction, Baltimore.
Pub Date 77
Note—48p.
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—*Educational Specifications, Elementary Secondary Education, *Facility Guidelines, Facility Planning, *Facility Requirements, Flexible Facilities, Furniture, *Science Education, Science Equipment, *Science Facilities, Science Programs, Space Classification
Identifiers—Maryland

These guidelines are designed to help Maryland's educators and citizens make informed choices about the types of facilities they will provide for teaching science in grades K-12. They are not a blueprint for facilities nor are they an attempt to standardize all science programs or facilities, but seek to identify elements to consider, people to involve, tasks to be completed, and a schedule to follow in planning for the renovation or construction of a school science facility. Sections discuss the planning process, the science program, facilities, equipment, safety, space requirements and utilization, and a planning timetable. (Author/MLF)

ED 138 463 SE 022 425
Lynch, Mervyn A. Offet, Lorna
Science Safety Procedure Handbook.
Edmonton Catholic Schools (Alberta).
Pub Date 77
Note—66p.; Contains colored pages
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Elementary Secondary Education, *Guides, Laboratory Procedures, *Laboratory Safety, *Safety, *Science Education, Science Materials
Identifiers—Canada

This booklet outlines general safety procedures in the areas of: (1) student supervision, (2) storage safety regulations, including lists of incompatible chemicals, techniques of disposal and storage; (3) fire; and (4) first aid. Specific sections exist for elementary, junior high school, senior high school, in which special procedures are detailed for units of study at the appropriate level. Also included is the Edmonton Catholic School District's regulations regarding accidents in the school. (CS)

ED 138 833 CE 011 243
Edson, C. H.
The Reform of Vocational Education: The Relationship between Jobs and Schooling.
Pub Date 7 Apr 77
Note—14p.: Paper presented at the annual meeting of the American Educational Research Association (New York City, New York, April 7, 1977)
EDRS Price MF-$0.83 HC-$1.67 Plus Postage.
Descriptors—*Career Education, Change Strategies, *Educational Change, Educational Development, *Educational History, Educational Philosophy, Educational Policy, Trend Analysis, *Vocational Education

Successful changes that took place as a result of vocational education during the first two decades of the twentieth century are examined and historical parallels are drawn with career education today. The major intent is to give one example of how historical inquiry can inform policymakers who want to design and oversee educational reforms. The success of vocational education is analyzed in terms of (1) structural innovations (such as the comprehensive high school, the junior high school, and vocational guidance); (2) an emerging ideological consensus that schools can—and should--prepare youth for jobs, and (3) the creation of new groups with vested interests in maintaining those structures (such as vocational education teachers, guidance counselors, and IQ testers). The author concludes that, in terms of ideology, the success of vocational education may be seen in the unquestioned acceptance of the idea that schools should and can prepare youth for rapidly changing career requirements, with the result that career educators tend to narrowly focus their attention on how the schools can best perform that function. Advocates of career education are urged to be aware that designing and overseeing educational reform requires a thorough understanding of all the questions implied (particularly the question of whether schools can prepare youth for jobs) and that historical inquiry need not be immodest about what it can contribute to that process. (LAS)

ED 141 145 SE 022 667
Where Have All the Menhaden Gone? A Learning Experience for Coastal and Oceanic Awareness Studies, No. 209. [Project COAST].
Delaware Univ., Newark. Coll. of Education.
Spons Agency—Office of Education (DHEW), Washington, D.C.
Pub Date 74
Note—27p.; For related documents, see SE 022 662-687. Contains occasional light type
EDRS Price MF-$0.83 HC-$2.06 Plus Postage.
Descriptors—Elementary School Science, *Elementary Secondary Education, *Instructional Materials, *Marine Biology, *Oceanology, *Population Trends, Secondary School Science, *Teaching Guides, Units of Study
Identifiers—*Fish, Project COAST

This unit focuses on the concept that populations of marine organisms are unevenly distributed. It is designed for upper elementary and secondary school students and will take 6-10 class periods. Students become involved in identifying various causes of the uneven distribution of marine populations, especially that of the menhaden population. Because no conclusive evidence is given that supports any one cause of the decline, the stud[illegible] are faced with the dilemma that there are [illegible]ctual answers to the problems. Included in the [illegible] are student materials, teaching suggestions, transparency masters, evaluation materials, and selected references. (RH)

ED 159 022 SE 024 802
Carey, Helen H., Ed.
Award Winning Energy Education Activities for Elementary and High School Teachers.
National Science Teachers Association, Washington, D.C.
Spons Agency—Energy Research and Development Administration, Oak Ridge, Tenn.
Report No.—ERHQ-0011
Pub Date 77
Note—52p.; Type size is small on some pages
Available from—ERDA Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830 (no price quoted)
EDRS Price MF-$0.83 HC-$3.50 Plus Postage.
Descriptors—*Elementary Secondary Education, *Energy, *Energy Conservation, Environmental Education, Heating, *Instructional Materials, *Science Activities, Science Education, Solar Radiation

This publication contains descriptions of the winning entries to the National Science Teachers Association (NSTA) Teacher Participation Contest conducted in 1976. This was a nationwide contest for the design of activities around energy themes at any grade level, K-12. The ten winning entries described here are: (1) Energy Units for Primary Grades; (2) Aluminum Recycling Experiment; (3) Energy in Art and Energy is All Around Us; (4) Black Gold; (5) Energy, Economy, Education; (6) Local Investigation in Container Use; (7) Kill A Watt; (8) Idea: Designing an Energy-Efficiency House; (9) Solar Heating and Cooling; and (10) Living with Wind Power. Many of these winners are designed for the senior high school. Each one has included a brief summary of what the activity teaches, what the students do, and how the activity might fit into the existing curriculum. (MR)

ED 161 727 SE 025 192
Energy Conservation Activities for the Classroom K-12.
Kentucky Dept. of Energy, Frankfort.; Kentucky State Dept. of Education, Frankfort.
Pub Date—[78]
Note—244p.
EDRS Price MF-$0.83 HC-$12.71 Plus Postage.
Descriptors—*Conservation Education, Curriculum Guides, Elementary Secondary Education, *Energy Conservation, *Environmental Education, *Learning Activities, *Science Activities, Science Education, Teaching Guides

After a brief introduction entitled "Where Does the Energy We Use Come From," this unit presents 86 activities. Each activity gives the title, concept, objectives, subject area, level, time involved, materials needed, procedures, and related career activities. Topics cover everything from housing insulation to alternate sources of energy to energy use by appliances and automobiles. The activities include game playing, science experiments, surveys, field trips, and others. The unit concludes with a bibliography. (BB)

ED 162 995 SE 025 419
Sagness, Richard L. Sagness, Rebecca L.
Selected Science Activities in Consumer Decision Making.
ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—76
Note—173p.
Available from—Information Reference Center (ERIC IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, Ohio 43212 ($3.00)
EDRS Price MF-$0.83 HC-$8.69 Plus Postage.
Descriptors—*Consumer Education, Curriculum, Elementary School Science, *Elementary Secondary Education, Instruction, *Instructional Materials, *Science Activities, Science Education, Secondary School Science, *Teaching Guides

This publication has been designed for use by teachers wishing to incorporate consumer education activities into their science program. Each activity is classified by grade level most appropriate for use, area of consumer education involved, specific topic, and consumer education concept involved. Activities are designated as suitable for grades 4-6, 7-9, and 10-12 although some can be adapted for use at different grade levels. Within each grade level grouping, activities are classified as relating to the consumer and the environment, foods, advertising, tools, health, clothing, product testing, or natural resources. For those activities not developed specifically for this publication, the original source of the activity is identified. (PEB)

ED 173 072 SE 027 730
Coon, Herbert L. Bowman, Mary Lynne
Energy Activities for the Classroom: Volume II.
ERIC Information Analysis Center for Science, Mathematics, and Environmental Education, Columbus, Ohio.
Spons Agency—National Inst. of Education (DHEW), Washington, D.C.
Pub Date—Dec 78
Note—165p.; For related document, see ED 130 833
Available from—Information Reference Center (ERIC IRC), The Ohio State University, 1200 Chambers Rd., 3rd Floor, Columbus, Ohio 43212 ($3.00)
Pub Type—Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC07 Plus Postage.
Descriptors—*Class Activities, Economics, *Elementary Secondary Education, *Energy, *Energy Conservation, Environmental Education, Fine Arts, Fuel Consumption, Fuels, History, *Instructional Materials, Language Arts, Mathematics Education, *Science Education, Science Materials, Scientific Concepts, Social Studies, Technology
Identifiers—*Energy Education, Information Analysis Products

This resource book contains descriptions of over 100 classroom activities designed to illustrate concepts relating to energy, its production, characteristics, use, and conservations. Each activity integrates the energy lesson into a concept that relates to one or more subject areas common to public school curricula. Many of the activities included in the document were developed by public school teachers. In addition to teaching activities, an annotated bibliography of energy teaching resources available from ERIC is provided. (RE)

ED 173 181 SE 028 524
Fox, Fred And Others
Framework for Science Programs.
Oregon State Dept. of Education, Salem.
Pub Date -79
Note—116p.; Contains occasional light type
Pub Type—Reports - Descriptive (141)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Curriculum Development, *Curriculum Guides, Educational Assessment, Educational Objectives, Elementary School Science, *Elementary Secondary Education, *Guidelines, Kindergarten, Laboratory Safety, Resource Materials, *Science Activities, Science Curriculum, *Science Education, Secondary School Science, *Teacher Role
Identifiers—*Oregon State Department of Education

This publication, developed by the Oregon Department of Education, presents a framework for science programs designed to help teachers organize their science curriculum to be consistent with Oregon's goal-based planning for K-12 instruction. It consists of six major sections. Section one presents the framework for Oregon's goal-based science curriculum which considers state goals, district goals, program goals, and course goals. This section also discusses competencies and presents goals of individual students. Section two presents sample activities which may take place in science classrooms. The first 12 activities treat science instruction itself. They consist of four in earth science (one each for K-3, 4-6, 7-9, 10-12), four in life science, and four in physical science. The next 20 activities illustrate how other special interests (prekindergarten, reading, math, career education, handicapped) may interact with the science curriculum. Section three presents safety in science programs. Section four presents assessing science programs. Section five presents resources. Section six contains an appendix which includes sample course goals, self-assessment checklist for science teachers, and procedures for developing staff agreement. (HM)

ED 176 993 SE 029 040
Minimal Performance Objectives for Science Education in Michigan.
Michigan State Dept. of Education, Lansing.
Pub Date—Jan 74
Note—57p.
Pub Type—Guides - Non-Classroom (055)
EDRS Price - MF01/PC03 Plus Postage.

Descriptors—Academic Achievement, Curriculum Planning, *Educational Objectives, Educational Resources, *Elementary Secondary Education, *Guidelines, *Science Curriculum, Science Instruction, Scientific Concepts, Scientific Literacy, Scientific Methodology, State Departments of Education, State Standards

Presented are performance objectives for Michigan elementary and secondary teachers of science. The objectives are to assist in the development of scientifically literate citizens as suggested by the National Science Teachers Association. The book is arranged according to grade levels. Each level is presented with an introduction to the grade level and a set of performance objectives for each. A glossary appears at the back. Members of the Task Force for the Development of Basic Science Objectives for Michigan are listed. (SA)

ED 180 134 EA 012 342

Giammatteo, Michael C. Giammatteo, Dolores M.

Executive Well-Being: Stress and Administrators.

National Association of Secondary School Principals, Reston, Va.

Pub Date—80

Note—67p.

Available from—NASSP, 1904 Association Drive, Reston, VA 22091 ($4.00; quantity discounts; orders of $10 or less must be accompanied by payment)

Pub Type— Guides - Non-Classroom (055)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Adjustment (to Environment), *Administrative Personnel, Administrator Attitudes, *Administrator Role, Anxiety, Communication Problems, Conceptual Schemes, Conflict, *Emotional Problems, Perception, Principals, *Stress Variables, Time, Withdrawal Tendencies (Psychology), Work Environment

This booklet explains the meaning and sources of stress, presents a model differentiating among several approaches to dealing with stress, and offers advice and self-help exercises to aid in alleviating the causes of stress. Each chapter topic is a component of the stress alleviation model: stress awareness, tolerance, stress reduction, and stress management. Emphasizing that unknown stressors have more power over people than recognized stressors, the stress awareness chapter presents eight exercises designed to help administrators become aware of stressors. The chapter on tolerance focuses on techniques and exercises to facilitate tolerance of stress as well as tolerance of the feelings or statements of others that are different from the administrator's own. The stress reduction chapter mentions practical tips to reduce stress, problem-solving techniques, and relaxation exercises. In the chapter on stress management, the authors discuss interpersonal conflict, time management, and attitude adjustment. (JM)

ED 180 743 SE 029 303

Wickens, David L., Ed.

Course of Study for Grades Kindergarten Through Twelve, 1979-1981.

California State Dept. of Education, Sacramento.

Pub Date—79

Note—285p.; Not available in hard copy due to copyright restrictions; Photographs may not reproduce well

Available from—Publications Sales, California State Dept. of Education, P.O. Box 271, Sacramento, CA 95802 (no price quoted)

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Curriculum, *Curriculum Development, Curriculum Guides, *Educational Objectives, *Elementary Secondary Education, *Instruction, Interdisciplinary Approach, *State School District Relationship, State Standards, *Statewide Planning

Presented is a resource guide designed for use in program planning at the school district level. The course of study provides an overview of the goals and objectives for 19 curriculum areas from kindergarten through twelfth grade in California. Four of these areas are described both separately and as they are infused into other areas. An overview of commonalities among the goals of the 19 curriculum areas is presented. Each curriculum area is defined in terms of goals and objectives and other descriptive material. The descriptive material includes a point of view to provide background information, vignettes, goals, objectives, samples of learner behaviors, and professional associations and their publications. Instructional strategies are suggested in a limited way. Curriculum areas included are art, bilingual-cultural, business, career, consumer, drama/theatre, language arts, environmental, foreign language, health, home economics, industrial arts, mathematics, multicultural, music, physical education, science, social sciences, and traffic safety. (BT)

ED 180 827 SE 029 699

Owens, Michael

Energy Education Curriculum Resource. Energy Education Workshop: Energy Sources of the Future.

Education Service Center Region 7, Kilgore, Tex.

Pub Date—79

Note—173p.; Page 55 removed due to copyright restrictions

Pub Type— Guides - Classroom - Teacher (052) — Guides - Non-Classroom (055)

EDRS Price - MF01/PC07 Plus Postage.

Descriptors—Curriculum, *Curriculum Development, *Curriculum Guides, *Curriculum Research, *Elementary Secondary Education, *Energy, *Energy Conservation, Interdisciplinary Approach, Science Education, Secondary Education, Social Studies

Identifiers—*Energy Education

This guide is designed to provide teachers with suggestions and assistance in equiping children as advocates of energy stewardship. It is divided into six discussion sections and one section dedicated to specific energy activities presented as curriculum guides for: (1) intermediate science, (2) high school science, (3) intermediate social studies, and (4) high school social studies. Discussion sections deal with energy education problems, energy education framework, energy saving, quick fix energy checklists, and Federal Energy Audits Grants. (Author/RE)

ED 182 138 SE 029 822

Mississippi Catalog of Competencies for Public Elementary and Secondary Science.

Mississippi State Dept. of Education, Jackson.

Pub Date—Sep 74

Note—190p.; Not available in hard copy due to marginal legibility of original document

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Accountability, *Competence, Elementary Secondary Education, Evaluation, *Objectives, *Performance Based Education, Science Curriculum, *Science Education, Science Instruction, *Student Evaluation

Presented in this continuing plan for education are listings of competencies that students enrolled in the public elementary and secondary schools of Mississippi are expected to achieve by the time a particular grade level or subject area in the field of science is completed. Included are the needs assessment, goals and priorities, objectives, and procedure utilized in developing the Catalog of Science Competencies. (BT)

ED 182 181 SE 030 102

Linn-Benton Education Service District Math Articulation Manual: Albany Area Schools.

Linn-Benton Independent Education District, Albany, Oreg.

Pub Date—77

Note—134p.; Contains occasional light and broken type

Pub Type— Guides - General (050) — Guides - Classroom - Learner (051)

EDRS Price - MF01/PC06 Plus Postage.

Descriptors—*Articulation (Program), Calculation, *Curriculum Guides, Elementary Education, *Elementary School Mathematics, Mastery Learning, *Mathematics Curriculum, Mathematics Instruction, Objectives, *Performance Based Education, Problem Solving, *Teacher Developed Materials

This guide was developed by the Albany area schools in recognition of the different needs, learning rates, and abilities of students. Three major areas of mathematics (computational skills and concepts, problem solving, and measurement) are included. A master list of competencies and performance indicators is given, as well as a list of competencies and performance indicators appropriate for each grade level (1-6). Each performance indicator has a skill level (introduce, develop, or master) indicated. (MK)

ED 183 368 SE 029 825

We Can Help. Environmental Education Teaching Resources. Teacher's Guide and 24 Outdoor Classroom Environmental Education Guides.

Minnesota Environmental Sciences Foundation, Inc., Minneapolis.

Spons Agency—Fish and Wildlife Service (Dept. of Interior), Washington, D.C.

Pub Date—75

Note—198p.; Not available in hard copy due to copyright restrictions; Contains occasional colored pages which may not reproduce well

Available from—Jenny Publishing Co., 57 Queen Ave., South, Minneapolis, MN 55405 ($15.00)

Pub Type— Guides - Classroom - Learner (051) — Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—Botany, Career Planning, Earth Science, *Ecology, *Elementary Secondary Education, *Environment, *Environmental Education, Interdisciplinary Approach, Land Use, Language Arts, Meteorology, Outdoor Education, Photography, Population Growth, Public Policy, Science Education, Sciences, *Social Studies, Surveys, Water Pollution Control, Water Resources, Wildlife Management

This teacher's guide, and accompanying set of 24 activity packets, is designed to direct outdoor learning experiences by students. Information is collected and then shared in large group classroom discussion. The 24 activity packets are divided into levels; Level I is recommended for grades 4-6 and Level II for grades 7-12. Each guide is a complete description of an investigation involving an environmental topic or issue. Each activity guide includes a synopsis, environmental goals, background, purpose, objectives, materials needed, introduction, and activity description. (RE)

ED 184 869 SE 030 527

Turkel, Tux

The Maine Teacher's Energy Primer.

Maine Audubon Society, Falmouth.

Pub Date—79

Note—41p.; Not available in hard copy due to copyright restrictions.

Available from—Maine Audubon Society, Energy Department, 118 U.S. Route One, Falmouth, ME 04105 ($5.00, $3.50 12 or more)

Pub Type— Guides - Classroom - Teacher (052)

EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.

Descriptors—*Class Activities, *Curriculum Development, Decision Making, Elementary Secondary Education, *Energy, *Energy Conservation, *Environmental Education, Middle Schools, *Science Education, Solar Radiation

Identifiers—*Energy Education

This guide is intended to serve a two-fold purpose: (1) to familiarize the teacher with the jargon, issues, and concepts of energy problems, and (2) to assist the teacher in preparing a curriculum dealing with energy issues. The guide is divided into four chapters: (1) energy basics, (2) uses of energy, (3) conservation, and (4) future scenarios. Each section contains background information and activity descriptions. Each chapter is prefaced with a specification of objectives and a glossary of terms. (RE)

ED 186 247 SE 030 608

Callison, Pris And Others

Guidelines to Science Education.

Kansas State Dept. of Education, Topeka.

Pub Date—[80]

Note—107p.

Pub Type— Guides - Classroom - Teacher (052) — Guides - Non-Classroom (055)

EDRS Price - MF01/PC05 Plus Postage.

Descriptors—Affective Objectives, Cognitive Objectives, *Educational Objectives, Educational Planning, Elementary School Science, *Elementary Secondary Education, *Guidelines, Psychomotor Objectives, *Science Education, Scientific Literacy, Secondary Education, Secondary School Science, *State Curriculum Guides

Presented are Kansas state guidelines for teaching science in grades K-12. This is designed to provide a rationale and structure which will enable educational planners and decision makers to develop and select science curricula. The content is intended for use by administrators in charge of curriculum, departmental and district science chairpersons, teachers, citizens, and students interested in science curriculum planning. The objectives given are also suggested as criteria for evaluation. (Author/SA)

ED 187 557 SE 030 943
LaHart, David E.
Solar '80s: A Teacher's Handbook for Solar Energy Education.
Florida State Solar Energy Center, Cape Canaveral.
Pub Date—Mar 80
Note—101p.; Contains light and broken type.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Conservation Education, *Curriculum Development, Elementary Secondary Education, Energy, *Energy Conservation, Environment, *Environmental Education, Fuel Consumption, *Fuels, Natural Resources, *Science Education, *Solar Radiation, Technological Advancement, Technology
Identifiers—*Energy Education

This guide is intended to assist the teacher in exploring energy issues and the technology of solar energy conversion and associated technologies. Sections of the guide include: (1) Rationale; (2) Technology Overview; (3) Sun Day Suggestions for School; (4) Backyard Solar Water Heater; (5) Solar Tea; (6) Biogas; (7) Solar Cells; (8) Economics; (9) Sundials; (10) Activities for Elementary Schools; (11) Activities for Secondary Schools; and (12) a bibliography and source listing for energy education materials. Other topics are covered in detail within the 19 chapters of the guide. (RE)

ED 187 573 SE 030 998
Science Framework, Kindergarten Through Grade 12.
Texas Education Agency, Austin. Div. of Curriculum Development.
Pub Date—[80]
Note—69p.
Available from—Science Section, Div. of Curriculum Development, Texas Education Agency, 201 East 11th St., Austin, TX 78701 ($1.00 while supply lasts).
Pub Type— Guides - General (050)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Course Descriptions, *Curriculum Development, *Elementary School Science, Elementary Secondary Education, *Kindergarten, *Science Curriculum, Science Education, *Secondary School Science, State Curriculum Guides, *State Programs

Presented is the framework of science programs for Texas public schools, K-12. This publication consists of four major sections in addition to an introduction which includes the rationale for developing this science framework and the function of the science curriculum. The first section presents 15 topics along with 36 suggested module titles and specified learner objectives for kindergarten through grade 5. A matrix correlation chart and a science content/process chart are also included. The second section presents a science framework for middle school, grades 6-8. Requirements and course suggestions are also included. The third section presents science framework for high school, grades 9-12. Requirements for graduation, minimum offerings by a school district, and course suggestions are also included. The fourth section presents an appendix which includes approved courses for grades 7-12, science framework matrix, and suggested procedures for implementing the science framework. (HM)

ED 188 947 SE 031 478
Friedman, Alan And Others
Planetarium Educator's Workshop Guide. International Planetarium Society Special Report No. 10.
California Univ., Berkeley. Lawrence Hall of Science
Spons Agency—National Science Foundation, Washington, D.C.
Pub Date—80
Grant—SED-77-18387
Note—190p.
Available from—The Spaceshop, Strasenburgh Planetarium, P.O. Box 1480, Rochester, NY 14603 (no price quoted).
Pub Type— Guides - Classroom - Teacher (052) — Guides - Non-Classroom (055)
EDRS Price - MF01/PC08 Plus Postage.
Descriptors—*Astronomy, Biological Sciences, Earth Science, Elementary Secondary Education, *Inservice Education, Learning Modules, *Museums, *Planetariums, Problem Solving, Science Activities, Science Programs, Space Sciences, Teaching Methods, *Workshops

Presented is a workshop guide for planetarium educators. Seven modules and four appendices focus on organizational patterns, learning theories, questioning strategies, activities for the planetarium, and incorporating all of the above into teaching. The four appendices include a list of the 1978 workshop participants, an annotated bibliography for planetarium educators, program descriptions from the Holt Planetarium at the Lawrence Hall of Science, astronomy quizzes, and classroom activities. (SA)

ED 191 680 SE 031 750
Department of Defense Dependents Schools Science Goals and Objectives.
Dependents Schools (DOD), Washington, D.C.
Pub Date—Sep 78
Note—93p.; Not available in hard copy due to marginal legibility of original document.
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01 Plus Postage. PC Not Available from EDRS.
Descriptors—Biological Sciences, *Curriculum Design, Earth Science, *Educational Objectives, Elementary School Science, Elementary Secondary Education, Physical Sciences, *Science Curriculum, Science Education, *Science Instruction, Secondary School Science, *Student Educational Objectives, Technology
Identifiers—*Dependents Schools

Presented is a statement of goals and objectives to be used by the overseas dependent schools. This document is intended as a guide for program instruction by the teacher, as a basis for the evaluation of either commercial materials or those developed locally, as a basis for further evaluation of science education in the dependent schools, and as a starting point for developing other dependent school science objectives. The purpose of science education in the dependent schools is to prepare all students to be scientifically literate citizens. The goals and objectives listed are general and are intended to be used by educators in the selection of the most appropriate content for the particular grade level for which the materials are to be utilized. Included in the materials is a summary of science goals and program objectives, programs and instructional objectives, content and concepts, processes of science, the nature of science, science and technology, and society and scientific attitudes and values. (Author/DS)

ED 193 069 SE 032 975
Peters, Linda, Ed. And Others
Course Goals in Biological and Physical Science, K-12.
Tri-County Goal Development Project, Portland, Oreg.
Spons Agency—Office of Education (DHEW), Washington, D.C.; Oregon State Board of Education, Salem.; Washington Office of the State Superintendent of Public Instruction, Olympia.
Pub Date—73
Note—887p.; Not available in hard copy due to copyright restrictions.
Available from—Commercial-Educational Distributing Services, P.O. Box 4791, Portland, OR 97208 ($33.00).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF06 Plus Postage. PC Not Available from EDRS.
Descriptors—Biological Sciences, Career Education, *Classification, *Elementary Secondary Education, Objectives, *Outcomes of Education, Physical Sciences, School Districts, Science Education, *Science Programs, Values Education

Presented are course goals which make explicit statements of possible science learning outcomes in grades K-12. These were prepared cooperatively by three school districts within the state of Oregon. Accompanying this list of course goals is a taxonomy which provides four sets of indexes for retrieving course goals in these areas: science program goals, career education program goals, knowledge and process classifications, and science subject matter taxonomy. Goals are additionally coded as to grade level, predominant concept/value words and index words. (CS)

ED 193 080 SE 033 013
Safety Practices for Science.
Texas Education Agency, Austin. Div. of Curriculum Development.
Pub Date—80
Note—74p.
Available from—Office of Publications Distribution, Texas Education Agency, 201 East 11th St., Austin, TX 78701 (Order No. CU 0841 02; $2.-00).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC03 Plus Postage.
Descriptors—Elementary School Science, *Elementary Secondary Education, *Guidelines, Laboratory Manuals, *Safety, School Safety, *Science Education, Secondary School Science, *State Standards

Designed to promote the use of safe, controlled investigations in science classrooms in Texas, this publication describes procedures to help teachers ensure the safety of all students in class and on field trips. Safety in the elementary science classroom and in secondary school science courses is discussed. Included are first-aid procedures, charts for safe storage of chemicals, and laboratory safety checklists. (Author/CS)

ED 194 306 SE 032 958
Hunt, John D., Ed.
Marine Organisms in Science Teaching.
Texas A and M Univ., College Station. Sea Grant Coll. Program.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.
Report No.—TAMU-SG-80-403
Pub Date—Sep 80
Grant—NA79AA-D-00127
Note—198p.
Available from—Marine Information Service, Sea Grant College Program, Texas A&M University, College Station, TX 77843 (Order No. TAMU-SG-80-403; $4.00).
Pub Type— Guides - Classroom - Learner (051)
EDRS Price - MF01/PC08 Plus Postage.
Descriptors—Biology, Elementary Secondary Education, *Inquiry, *Laboratory Experiments, *Marine Biology, Oceanography, *Science Activities, Science Curriculum, Science Education

This collection of student activities for grades four through twelve presents action-oriented experiences with hardy aquatic organisms as the foundation for a laboratory-oriented science program. The format is characterized by pre-lab, post-lab, and student sections. Pre-lab topics include level, concepts, facts, suggested prerequisite skills, student performance objectives, materials, time, cautions, and definition of terms. The teacher's post-lab section includes possible answers to questions, discussion, evaluation, follow-up experiences, and references. Student sections, appropriate for copying, contain general information, objectives, materials, student discovery activities, and processes. (CS)

ED 198 010 SE 034 397
Mauldin, Lundie Frankenberg, Dirk
North Carolina Marine Education Manual, Unit One: Coastal Geology.
North Carolina State Univ., Raleigh. Sea Grant Coll.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.
Report No.—UNC-SG-78-14-A
Pub Date—Aug 78
Grant—NOAA-04-6-158-44054
Note—129p.; For related documents, see SE 034 398-401.
Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($1.50).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC06 Plus Postage.
Descriptors—*Earth Science, Elementary School

Science, Elementary Secondary Education, Environmental Education, *Geology, Intermediate Grades, Marine Biology, *Oceanography, *Science Education, Science Instruction, *Secondary School Science
Identifiers—Coastal Zones, Estuaries

Presented are teaching materials designed to supplement North Carolina's course of study plans in earth science for the intermediate grades and junior high schools. This manual is one of a collection produced by North Carolina teachers and university faculty under a Sea Grant project entitled "Man and the Seacoast." Included are 27 activities and related materials on plate tectonics, coastal plain sediments, island geology and ecology, and estuarine geology and ecology. Each section contains background reading, vocabulary, three to six activities, and information on films, books and other related resources. Also provided are a table depicting the relationship between the activities and state curriculum guidelines, and a summary of this unit's goals and behavioral objectives. (WB)

ED 198 011 SE 034 398
Mauldin, Lundie Frankenberg, Dirk
North Carolina Marine Education Manual, Unit Two: Seawater.
North Carolina State Univ., Raleigh. Sea Grant Coll.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.
Report No.—UNC-SG-78-14-B
Pub Date—Aug 78
Grant—NOAA-04-6-158-44054
Note—90p.; For related documents, see SE 034 397-401.
Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($1.50).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC04 Plus Postage.
Descriptors—*Earth Science, Environmental Education, Geology, Junior High Schools, *Oceanography, Physics, *Science Education, Science Instruction, Secondary Education, *Secondary School Science, *Water Resources
Identifiers—Coastal Zones, Waves

Although North Carolina's coastal water is chemically and physically similar to other bodies of sea water, the specific manner in which tides and waves act upon the coastline is unique. Accordingly, the 30 activities presented in this manual are intended to help junior high school students understand how physical forces modify coastal areas. While some lessons relate specifically to North Carolina, the majority address more general concepts of salinity, density, nutrient content, tidal forces, and wave motion. Each section contains background reading, vocabulary, 4 to 14 activities, and information on films, books, and other related resources. Also provided are a table depicting the relationship between the activities and state curriculum guidelines, and a summary of this unit's goals and behavioral objectives. The manual is one of a collection developed by North Carolina teachers and university faculty under a Sea Grant project entitled "Man and the Seacoast." (WB)

ED 198 012 SE 034 399
Mauldin, Lundie Frankenberg, Dirk
North Carolina Marine Education Manual, Unit Three: Coastal Ecology.
North Carolina State Univ., Raleigh. Sea Grant Coll.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.
Report No.—UNC-SG-78-14-C
Pub Date—Aug 78
Grant—NOAA-04-6-158-44054
Note—114p.; For related documents, see SE 034 397-401.
Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($1.50).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC05 Plus Postage.
Descriptors—Biology, *Ecology, *Environmental Education, Junior High Schools, *Marine Biology, Outdoor Education, *Science Education, Science Instruction, Secondary Education, *Secondary School Science

Two dozen activities on the ecology of coastal areas, with special emphasis on North Carolina's coastline, comprise this manual for junior high school science teachers. Provided are a table correlating these lessons with state curriculum guidelines, and a summary of the unit's goals and behavioral objectives. Among the topics included are coastal habitats, fish, plankton, intertidal organisms, and food chains. Each section contains background information, vocabulary, 2 to 12 activities, and a list of films, books, and other related resources. This manual is one of a collection produced by North Carolina teachers and university faculty under the "Man and the Seacoast" project funded by Sea Grant. (WB)

ED 198 013 SE 034 400
Mauldin, Lundie, Ed. And Others
North Carolina Marine Education Manual, Unit Four: Coastal Beginnings.
North Carolina State Univ., Raleigh. Sea Grant Coll.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.
Report No.—UNC-SG-78-14-E
Pub Date—Jun 79
Grant—NOAA-04-6-158-44054
Note—197p.; For related documents, see SE 034 397-401. Photographs may not reproduce well.
Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($2.00).
Pub Type— Guides - Classroom - Teacher (052)
EDRS Price - MF01/PC08 Plus Postage.
Descriptors—*Anthropology, Elementary Secondary Education, *Environmental Education, *Ethnology, *Geography, Interdisciplinary Approach, Marine Biology, Oceanography, Science Education, *Social Studies, United States History
Identifiers—Coastal Zones

Presented are simulations, puzzles, class discussions, crafts and other activities designed to introduce the past cultures of North Carolina's coastal peoples to elementary and secondary students. The manual is one of several produced by North Carolina teachers and university faculty under the "Man and the Seacoast" project with Sea Grant funding. Included are over 50 lessons on resource use by coastal peoples, anthropological techniques, early explorers, and coastal geography. Each section contains background reading, vocabulary, several activities, and information on films, books and other related resources. Also provided are a summary of goals and behavioral objectives, and a table which relates these activities to state curriculum guidelines. (WB)

ED 198 014 SE 034 401
Mauldin, Lundie Frankenberg, Dirk
North Carolina Marine Education Manual: Appendices.
North Carolina State Univ., Raleigh. Sea Grant Coll.
Spons Agency—National Oceanic and Atmospheric Administration (DOC), Rockville, Md. National Sea Grant Program.; North Carolina State Dept. of Administration, Raleigh.
Report No.—UNC-SG-78-14-D
Pub Date—Aug 78
Grant—NOAA-04-6-158-44054
Note—42p.; For related documents, see SE 034 397-400.
Available from—UNC Sea Grant, 105 1911 Building, North Carolina State Univ., Raleigh, NC 27607 ($1.00).
Pub Type— Reference Materials (130)
EDRS Price - MF01/PC02 Plus Postage.
Descriptors—Audiovisual Aids, Elementary Secondary Education, Environmental Education, *Field Trips, *Marine Biology, *Oceanography, *Reference Materials, *Science Education, Science Materials, Social Studies

Presented are appendices to a series of four manuals of marine education activities produced by North Carolina teachers and college faculty under a Sea Grant project entitled "Man and the Seacoast." Information on relevant films, periodicals, federal and state resources, games, and marine careers is provided. Also included are directions for keeping a marine aquarium, and "Shifting Sands" which is a guide to field trips along the North Carolina coast. (WB)

SUBJECT INDEX

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*AIR POLLUTION CONTROL	(1)	ED082978
AIR POLLUTION CONTROL	(2)	ED047939 ED036502
AIRPORTS	(2)	ED111625 ED111626
ALABAMA	(2)	ED141531 ED141532
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*ALGORITHMS	(1)	ED127192
*ALLIED HEALTH OCCUPATIONS EDUCATION	(10)	ED188937 ED188938 ED188939 ED188940 ED188941 ED188942 ED188943 ED188944 ED188945 ED188946

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*ALTERNATORS (ELECTRIC GENERATORS)	(1)	ED131293
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*AMERICAN INDIANS	(2)	ED099149 ED116995
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*ANEMIA	(1)	ED182172
*ANIMAL BEHAVIOR	(2)	ED141085 ED141086
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ANIMAL FACILITIES	(2)	ED097209 ED196673
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ANIMAL SCIENCE	(1)	ED141175
*ANIMAL TRACKS	(2)	ED196661 ED196662
*ANNOTATED BIBLIOGRAPHIES	(2)	ED107519 ED126891
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*ANSWER SHEETS	(7)	ED190359 ED190363 ED190367 ED190371 ED190375 ED190378 ED190382
*ANTHROPOLOGY	(2)	ED133161 ED198013
ANXIETY	(1)	ED180134
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ASTRONOMY (10) ED032236 ED071887 ED107200 ED107897 ED140601 ED177014 ED190368
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*ATOMIC ENERGY COMMISSION (1). ED107519

ATOMIC ENERGY COMMISSION (7) ED107517 ED107518 ED107520 ED107521 ED107522 ED107523 ED107524

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*ATOMIC THEORY (7) ED064096 ED071902 ED071903 ED071904 ED071905 ED071906 ED086520

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AUDITORY TRAINING (1) ED100078

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*AUSTRALIAN SCIENCE EDUCATION PROJECT (1) ED065289

*AUSTRALIAN SCIENCE EDUCATION PROJECT (ASEP) (1) ED113176

*AUTOINSTRUCTIONAL AIDS (7) ED070907 ED070909 ED070912 ED070916 ED093694 ED096125 ED096549

AUTOINSTRUCTIONAL METHODS (1) ED162894

*AUTOINSTRUCTIONAL PROGRAMS (31) ED095025 ED095026 ED095027 ED095028 ED096117 ED096119 ED096120
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AUTOINSTRUCTIONAL PROGRAMS (6) ED095024 ED095029 ED096123 ED096134 ED096135 ED096137

*AVIATION TECHNOLOGY (1) ED118732

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BACTERIA (1) ED141160

*BASIC SKILLS (6) ED128080 ED128081 ED128082 ED128083 ED128084 ED128085

BASIC SKILLS (2) ED127179 ED127181
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*BEAVER (1) ED164348

*BEHAVIORAL OBJECTIVES (30) ED028101 ED036428 ED038726 ED059900 ED066505 ED066506 ED066507
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ED079031 ED079134 ED079135 ED079137 ED086519 ED086521 ED086524 ED088244
ED089979 ED090030 ED090031 ED095695 ED100709 ED100710 ED191692

BEHAVIORAL OBJECTIVES (41) ED037343 ED063464 ED063465 ED070597 ED079025 ED079133 ED086476
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ED114677 ED136061

*BEHAVIOR CHANGE (1) ED086522

*BIBLIOGRAPHIES (4) ED094514 ED101012# ED107519 ED113176

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*BILINGUAL EDUCATION (1) ED087623

*BIOCHEMISTRY (1) ED090030

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*BIOLOGICAL INFLUENCES (1) ED093595

BIOLOGICAL INFLUENCES (2) ED111631 ED111632

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*CAREER OPPORTUNITIES (4) ED111613 ED111614 ED117565 ED117566

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CASE STUDIES (4) ED064042 ED089984 ED119942# ED126891

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*CHILDRENS LITERATURE	(1)	ED190401						
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COMMUNITY PROBLEMS	(2)	ED047939 ED173086
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COMMUNITY STUDY	(1)	ED098098
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*COURSE OBJECTIVES	(3)	ED077776 ED178267 ED191675
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CURRICULUM ENRICHMENT	(2)	ED106105 ED171570
*CURRICULUM GUIDES	(158)	ED024458 ED052067 ED054118 ED058455 ED058456 ED060587 ED060588 ED063162 ED068310 ED068367 ED068368 ED068465 ED070766 ED071264 ED071265 ED071266 ED071267 ED071772 ED072042 ED075441 ED075976 ED077737 ED077738 ED079054 ED079055 ED079056 ED079138 ED079140 ED079281 ED079566 ED080371 ED080372 ED080373 ED080374 ED080375 ED080376 ED080377 ED080378 ED083044 ED085232* ED086524 ED086526 ED086528 ED087183 ED087189 ED087623 ED087912 ED087913 ED087914 ED087915 ED087916 ED088244 ED089036 ED089037 ED089041 ED089043 ED089483 ED091175 ED091176 ED091177 ED091222 ED093575 ED093576 ED093619 ED093641 ED093667 ED093699 ED093700 ED094956 ED096113 ED096138 ED097209 ED097210 ED097213 ED097214 ED097215 ED097217 ED097221 ED098067 ED098073 ED100709 ED100710 ED101939 ED101942 ED102328 ED106105 ED106606 ED107777 ED107824 ED107827 ED109849 ED109850 ED110768 ED110769 ED112187 ED114466 ED114467 ED114568 ED114677 ED117325 ED118418 ED118732 ED118963 ED123059 ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184

		ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197 ED128080 ED128081 ED128082 ED128083 ED128084 ED128085 ED134461 ED134462 ED136530 ED137063 ED140601 ED141083 ED141084 ED141085 ED141086 ED173164 ED173181 ED179419 ED180827 ED182181 ED186239 ED186281 ED187555 ED190401 ED191663 ED191676
CURRICULUM GUIDES	(46)	ED046735 ED063464 ED063465 ED079099 ED080861 ED086520 ED086521 ED086522 ED086837 ED091174 ED093593 ED093594 ED093595 ED093596 ED093686 ED095695 ED096115 ED096417 ED099188 ED099189 ED101937 ED111610 ED111614 ED111616 ED111618 ED111620 ED111622 ED111624 ED111626 ED111628 ED111629 ED111630 ED111639 ED136058 ED134742 ED136061 ED137538 ED141531 ED141532 ED161727 ED177012 ED177013 ED177014 ED177015 ED180743 ED196699
*CURRICULUM PLANNING	(4)	ED138442 ED141499 ED141500 ED141501
CURRICULUM PLANNING	(1)	ED127165
*CURRICULUM RESEARCH	(1)	ED180827
CURRICULUM RESEARCH	(1)	ED104689
*CYTOLOGY	(1)	ED096145
CYTOLOGY	(1)	ED096148
*DARCEE	(6)	ED128080 ED128081 ED128082 ED128083 ED128084 ED128085
DATA PROCESSING	(1)	ED184874
*DEATH	(1)	ED142488
*DECISION MAKING	(1)	ED191745
DECISION MAKING	(4)	ED126891 ED128294 ED184869 ED191743
*DECISION MAKING SKILLS	(1)	ED166012
DECISION MAKING SKILLS	(3)	ED136061 ED137538 ED141532
DEFINITIONS	(1)	ED099149
*DELAWARE	(2)	ED100057 ED123059
*DEL MOD SYSTEM	(42)	ED093686 ED093687 ED093690 ED093692 ED093694 ED096113 ED096115 ED096117 ED096119 ED096120 ED096121 ED096122 ED096123 ED096124 ED096125 ED096126 ED096127 ED096128 ED096129 ED096130 ED096131 ED096132 ED096133 ED096134 ED096135 ED096136 ED096137 ED096138 ED096139 ED096140 ED096141 ED096142 ED096143 ED096144 ED096145 ED096146 ED096147 ED096148 ED096149 ED096150 ED096152 ED119993
DEL MOD SYSTEM	(2)	ED123055 ED123059
DEMOGRAPHY	(1)	ED097215
DEMONSTRATION PROJECTS	(1)	ED120348
*DEMONSTRATIONS (EDUCATIONAL)	(3)	ED065293 ED091164 ED091215
DEMONSTRATIONS (EDUCATIONAL)	(1)	ED091153
DEPARTMENT OF DEFENSE	(2)	ED111619 ED111620
*DEPENDENTS SCHOOLS	(1)	ED191680

DEPLETED RESOURCES	(1)	ED182135
DEVELOPED NATIONS	(1)	ED187517*
*DEVELOPING NATIONS	(1)	ED119942*
DEVELOPING NATIONS	(1)	ED187517*
DEVELOPMENT	(2)	ED101012* ED111630
DEVELOPMENTAL PROGRAMS	(2)	ED063464 ED063465
DIAGNOSTIC TEACHING	(1)	ED089483
DIATOMS	(1)	ED141154
*DIGITAL COMPUTERS	(1)	ED089740
DIGITAL EQUIPMENT CORPORATION	(1)	ED089740
*DISABILITIES	(1)	ED196721
DISABILITIES	(1)	ED184875
*DISADVANTAGED YOUTH	(8)	ED052000 ED052001 ED052002 ED052003 ED052004 ED052005 ED184873 ED184874
*DISCOVERY LEARNING	(2)	ED073929 ED073930
DISCOVERY PROCESSES	(1)	ED139522
DISCRIMINATORY ATTITUDES (SOCIAL)	(1)	ED130058
DISEASES	(1)	ED182172
DISTRICT OF COLUMBIA	(2)	ED011000 ED011507
DIVISION	(1)	ED127185
DRAMATICS	(1)	ED136530
*EARLY CHILDHOOD EDUCATION	(7)	ED097210 ED128080 ED128081 ED128082 ED128083 ED128084 ED128085
EARLY CHILDHOOD EDUCATION	(3)	ED100652 ED136530 ED139522
*EARTH SCIENCE	(55)	ED021745 ED025428 ED025429 ED042638 ED042645 ED045411 ED052004 ED052005 ED052607 ED061060 ED068277 ED070672 ED070673 ED070674 ED070675 ED079025 ED079047 ED084081 ED086524 ED086557 ED089037 ED090029 ED090032 ED091154 ED094956 ED096124 ED097214 ED100663 ED111661 ED128244 ED141148 ED141156 ED170141 ED173160 ED173161 ED173164 ED177013 ED178306 ED178307 ED178338 ED178339 ED178340 ED178341 ED178342 ED178343 ED178344 ED178345 ED178346 ED178347 ED179352 ED180810 ED183374 ED193048 ED198010 ED198011
EARTH SCIENCE	(34)	ED024592 ED046785 ED060587 ED079139 ED086556 ED089979 ED091175 ED091222 ED093699 ED093700 ED096113 ED106088 ED106089* ED108940 ED125934 ED141150 ED141153 ED141155 ED141160 ED141161 ED141175 ED177012 ED177014 ED177015 ED178332 ED179353 ED179354 ED179355 ED180813 ED183368 ED187517* ED188947 ED191680 ED196781
*EARTH SCIENCE CURRICULUM PROJECT	(10)	ED178338 ED178339 ED178340 ED178341 ED178342 ED178343 ED178344 ED178345 ED178346 ED178347
EASTCHESTER NEW YORK SCHOOLS	(5)	ED070671 ED070672 ED070673 ED070674 ED070675

*ECOLOGICAL FACTORS	(6)	ED093593 ED093594 ED093596 ED164347 ED164349 ED164350
ECOLOGICAL FACTORS	(1)	ED093595
*ECOLOGY	(69)	ED042634 ED042635 ED042636 ED042638 ED044302 ED046735 ED053945 ED060587 ED064131 ED067299 ED079099 ED079139 ED080377 ED081609 ED081610 ED081611 ED086553 ED090031 ED092357 ED093593 ED093594 ED093595 ED093596 ED095027 ED096130 ED096133 ED096134 ED096135 ED096138 ED096140 ED097221 ED098073 ED098098 ED100777 ED101942 ED103234 ED103244 ED103247 ED103248 ED103249 ED103250 ED103251 ED103253 ED106088 ED106089* ED133146 ED133161 ED141153 ED141155 ED162915 ED164348 ED175730 ED177015 ED178296 ED178297 ED180808 ED180809 ED180813 ED180814 ED183363 ED183368 ED187517* ED193050 ED193052 ED194325 ED195589 ED196731 ED196735 ED198012
ECOLOGY	(39)	ED034676 ED042622 ED042645 ED045380 ED045381 ED061060 ED068325 ED070588 ED079141 ED086366 ED086490 ED086502 ED086522 ED094912 ED097209 ED097215 ED099149 ED099159 ED103241 ED106074 ED139522 ED141033 ED141034 ED164349 ED173161 ED173163 ED173164 ED173165 ED176723 ED177012 ED177013 ED177014 ED178339 ED178341 ED180805 ED180811 ED180812 ED183374 ED194302
ECONOMIC AWARENESS	(1)	ED063465
*ECONOMICS	(1)	ED186281
ECONOMICS	(8)	ED107517 ED107522 ED164352 ED173072 ED173163 ED173165 ED179351 ED187554
*ECOSYSTEMS	(1)	ED103234
EDEA TITLE I	(1)	ED068368
*EDUCABLE MENTALLY HANDICAPPED	(17)	ED046168 ED071264 ED071265 ED071266 ED071267 ED079881 ED087188 ED087189 ED091902 ED093593 ED093595 ED094514 ED097217 ED101937 ED101939 ED109849 ED109850
*EDUCATIONAL ACCOUNTABILITY	(1)	ED100057
EDUCATIONAL ADMINISTRATION	(1)	ED100061
EDUCATIONAL ALTERNATIVES	(1)	ED119942*
*EDUCATIONAL ASSESSMENT	(1)	ED179402
EDUCATIONAL ASSESSMENT	(1)	ED173181
*EDUCATIONAL CHANGE	(1)	ED138833
EDUCATIONAL CHANGE	(1)	ED100061
EDUCATIONAL COORDINATION	(1)	ED100057
EDUCATIONAL DEVELOPMENT	(1)	ED138833
*EDUCATIONAL FACILITIES	(1)	ED134408
*EDUCATIONAL GAMES	(4)	ED084016 ED089740 ED179357 ED196676
*EDUCATIONAL HISTORY	(1)	ED138833
EDUCATIONAL INNOVATION	(1)	ED126891
EDUCATIONAL LEGISLATION	(1)	ED034697
EDUCATIONALLY DISADVANTAGED	(2)	ED184873 ED184874

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EDUCATIONAL MEDIA	(1)	ED180772
EDUCATIONAL METHODS	(1)	ED196702
*EDUCATIONAL OBJECTIVES	(23)	ED011507 ED036428 ED037343 ED074202 ED077776 ED079054 ED079055 ED079056 ED087912 ED087913 ED087914 ED087915 ED087916 ED100057 ED117325 ED139522 ED141499 ED141500 ED141501 ED176993 ED180743 ED186247 ED191680
EDUCATIONAL OBJECTIVES	(17)	ED024458 ED089036 ED089037 ED089041 ED089043 ED107824 ED110768 ED110769 ED114523 ED118963 ED119942* ED134461 ED134462 ED141531 ED141532 ED173181 ED184874
EDUCATIONAL PHILOSOPHY	(1)	ED138833
*EDUCATIONAL PLANNING	(1)	ED100057
EDUCATIONAL PLANNING	(1)	ED186247
EDUCATIONAL POLICIES COMMISSION	(1)	ED011507
EDUCATIONAL POLICY	(2)	ED100057 ED138833
EDUCATIONAL PRACTICE	(1)	ED100061
EDUCATIONAL PROGRAMING OF CULTURAL HERITAGE	(1)	ED046215
*EDUCATIONAL PROGRAMS	(2)	ED108874 ED108875
EDUCATIONAL PROGRAMS	(2)	ED104645 ED118963
EDUCATIONAL PROGRAMS DIVISION	(1)	ED032236
EDUCATIONAL PSYCHOLOGY	(1)	ED065289
*EDUCATIONAL RESEARCH	(4)	ED094958 ED095017 ED104689 ED134408
EDUCATIONAL RESEARCH	(2)	ED089984 ED162894
*EDUCATIONAL RESOURCES	(1)	ED136509
EDUCATIONAL RESOURCES	(7)	ED089036 ED089037 ED089041 ED089043 ED132044 ED176993 ED180772
*EDUCATIONAL SPECIFICATIONS	(1)	ED136444
EDUCATIONAL STRATEGIES	(1)	ED100057
EDUCATION OF THE HANDICAPPED ACT	(1)	ED136530
ELECTRICAL OCCUPATIONS	(1)	ED107897
*ELECTRICITY	(23)	ED071898 ED071900 ED071901 ED091176 ED099496 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512 ED124370 ED173164
ELECTRICITY	(10)	ED071897 ED071899 ED093699 ED107521 ED107522 ED107523 ED180804 ED182180 ED183392 ED186281
*ELECTRONICS	(17)	ED099496 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512
ELECTRONICS	(1)	ED107521

ELEMENTARY AND SECONDARY EDUCATION ACT TITLE III	(1)	ED042636						
*ELEMENTARY EDUCATION	(34)	ED042639	ED100061	ED100637	ED100653	ED100654	ED100655	ED100656
	ED100657	ED100658	ED109850	ED110769	ED133146	ED138462	ED141142	ED162894
	ED164347	ED164348	ED164349	ED164350	ED164351	ED167410	ED167424	ED175086
	ED174442	ED174472	ED175714	ED175715	ED180803	ED180804	ED180805	ED180811
	ED182180	ED186231	ED186281					
ELEMENTARY EDUCATION	(97)	ED046215	ED100057	ED100078	ED100079	ED101013	ED103233	ED103235
	ED103245	ED103247	ED103248	ED103249	ED104689	ED104860	ED106606	ED108940
	ED111661	ED111662	ED111663	ED111664	ED112187	ED114467	ED114523	ED116995
	ED118418	ED120348	ED127160	ED127164	ED127165	ED127169	ED127170	ED127171
	ED127172	ED127173	ED127174	ED127175	ED127176	ED127177	ED127178	ED127179
	ED127180	ED127181	ED127183	ED127184	ED127185	ED127186	ED127187	ED127188
	ED127189	ED127190	ED127191	ED127192	ED127193	ED127194	ED127195	ED127196
	ED127197	ED132044	ED138442	ED141500	ED164354	ED167409	ED167421	ED177013
	ED179772	ED180808	ED180833	ED182107	ED182181	ED184875	ED188929	ED188930
	ED188931	ED188932	ED188933	ED188934	ED190401	ED191663	ED191675	ED191743
	ED193662	ED193074	ED195389	ED195391	ED196656	ED196657	ED196658	ED196659
	ED196660	ED196661	ED196662	ED196669	ED196671	ED196673	ED196674	ED196675
	ED196676	ED197984						
*ELEMENTARY GRADES	(14)	ED062164	ED066506	ED067218	ED068866	ED070583	ED073929	ED073930
	ED075217	ED075219	ED075221	ED077776	ED093649	ED093673	ED137063	
ELEMENTARY GRADES	(23)	ED068325	ED080361	ED080366	ED082927	ED095294	ED103234	ED103235
	ED103236	ED103237	ED103238	ED103239	ED103241	ED103243	ED103244	ED103245
	ED103246	ED103247	ED103248	ED103249	ED103250	ED103251	ED103252	ED103253
*ELEMENTARY SCHOOL CURRICULUM	(2)	ED068465	ED193074					
ELEMENTARY SCHOOL CURRICULUM	(2)	ED054939	ED112187					
*ELEMENTARY SCHOOL GUIDANCE	(1)	ED114523						
ELEMENTARY SCHOOL GUIDANCE	(1)	ED141500						
*ELEMENTARY SCHOOL MATHEMATICS	(31)	ED127164	ED127165	ED127169	ED127170	ED127171	ED127172	ED127173
	ED127174	ED127175	ED127176	ED127177	ED127178	ED127179	ED127180	ED127181
	ED127183	ED127184	ED127185	ED127186	ED127187	ED127188	ED127189	ED127190
	ED127191	ED127192	ED127193	ED127194	ED127195	ED127196	ED127197	ED182181
ELEMENTARY SCHOOL MATHEMATICS	(3)	ED141500	ED182107	ED194347#				
*ELEMENTARY SCHOOL SCIENCE	(121)	ED011000	ED021745	ED021746	ED024592	ED025436	ED034676	ED036428
	ED042643	ED042645	ED045841	ED046735	ED047939	ED052067	ED054939	ED064042
	ED064043	ED064044	ED064068	ED068465	ED081609	ED085044	ED086500	ED086503
	ED089979	ED089993	ED091174	ED091222	ED092389	ED092390	ED092391	ED093575
	ED093641	ED093687	ED093692	ED093699	ED094958	ED096132#	ED097209	ED097210
	ED097213	ED098067	ED098073	ED103233	ED104689	ED108940	ED108943	ED111661
	ED111662	ED111663	ED111664	ED118418	ED123055	ED127160	ED127164	ED127165
	ED127169	ED127170	ED127171	ED127172	ED127173	ED127174	ED127175	ED127176
	ED127177	ED127178	ED127179	ED127180	ED127181	ED127183	ED127184	ED127185
	ED127186	ED127187	ED127188	ED127189	ED127190	ED127191	ED127192	ED127193
	ED127194	ED127195	ED127196	ED127197	ED132044	ED133146	ED134461	ED138442
	ED138462	ED139522	ED164354	ED167409	ED167421	ED167424	ED174472	ED179772
	ED179838	ED187573	ED188929	ED188930	ED188931	ED188932	ED188933	ED188934
	ED191663	ED191675	ED193662	ED194347#	ED195391	ED196656	ED196657	ED196658
	ED196659	ED196660	ED196661	ED196662	ED196673	ED196674	ED196675	ED196676
	ED196735	ED197984						
ELEMENTARY SCHOOL SCIENCE	(42)	ED028101	ED032236	ED042634	ED042635	ED042636	ED042638	ED045381
	ED071772	ED079054	ED079055	ED079056	ED080359	ED091173	ED097221	ED107519

ED120348 ED134462 ED141083 ED141084 ED141085 ED141086 ED141145 ED141500
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ED180808 ED182107 ED184875 ED186247 ED186281 ED191680 ED193083 ED196669
ED196671 ED196721 . ED198010

*ELEMENTARY SCHOOL STUDENTS (4) ED065293 ED089483 ED101013 ED180838

ELEMENTARY SCHOOL STUDENTS (2) ED088244 ED141531

ELEMENTARY SCHOOL TEACHERS (2) ED107200 ED141500

*ELEMENTARY SCIENCE (1) ED086490

ELEMENTARY SCIENCE (1) ED084016

*ELEMENTARY SCIENCE STUDY (1) ED167409

ELEMENTARY SCIENCE STUDY (2) ED068465 ED197934

*ELEMENTARY SECONDARY EDUCATION (13) ED118758 ED134461 ED138463 ED141145 ED159022 ED162895 ED164352
ED164353 ED173072 ED173181 ED174479 ED176993 ED180743 ED180827 ED183368
ED186247 ED193069 ED193089

ELEMENTARY SECONDARY EDUCATION (53) ED100061 ED103244 ED103250 ED106074 ED108874 ED108875 ED108943
ED115032 ED123564 ED128244 ED128245 ED129605 ED129677 ED134462 ED135192
ED136444 ED136509 ED140601 ED141083 ED141084 ED141085 ED141086 ED141499
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ED196668 ED196670 ED196721 ED198010 ED198013 ED198014

ELEMENTARY SECONDARY EDUCATION ACT TITLE (1) ED100656

*ELEMENTARY SECONDARY EDUCATION ACT TITLE I (1) ED074202

ELEMENTARY SECONDARY EDUCATION ACT TITLE I (2) ED093699 ED093700

*ELEMENTARY SECONDARY EDUCATION ACT TITLE III (7) ED092389 ED092390 ED092391 ED093593 ED093594 ED093595 ED093596

ELEMENTARY SECONDARY EDUCATION ACT TITLE III (56) ED068325 ED081193 ED086500 ED086502 ED086552 ED086553 ED086554
ED086555 ED086556 ED086557 ED086837 ED088244 ED089483 ED091222 ED093599
ED093641 ED093649 ED097209 ED097210 ED097213 ED097214 ED097215 ED097217
ED097221 ED098067 ED098073 ED100652 ED100653 ED100654 ED100655 ED100657
ED100658 ED100662 ED100663 ED100667 ED100697 ED100698 ED100709 ED100710
ED101937 ED101939 ED106088 ED106089# ED124370 ED124373 ED124374 ED124376
ED124379 ED124380 ED124381 ED124384 ED124393 ED133146 ED133161 ED133162
ED141175

ELEMENTARY SECONDARY EDUCATION ACT TITLE VII (1) ED087623

EMBRYOLOGY (1) ED045381

EMOTIONAL ADJUSTMENT (1) ED101012#

*EMOTIONAL PROBLEMS (1) ED180134

ENDANGERED SPECIES (1) ED196735

*ENERGY (76) ED064096 ED071895 ED089993 ED093649 ED093656 ED095024 ED095029
ED101937 ED101959 ED107517 ED107518 ED107520 ED107521 ED107522 ED107523
ED111662 ED111663 ED111664 ED127160 ED127161 ED129677 ED133162 ED134422
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ENERGY	(25)	ED064095 ED064097 ED071892 ED071894 ED071896 ED079027 ED079023 ED096130 ED099188 ED111611 ED111615 ED111616 ED111621 ED111622 ED134424 ED162851 ED166009 ED166010 ED174475 ED175710 ED179375 ED179419 ED184817 ED186281 ED187557
*ENERGY CONSERVATION	(42)	ED127160 ED127161 ED141164 ED159022 ED161727 ED162886 ED166009 ED166010 ED166011 ED166012 ED166013 ED166014 ED166015 ED173072 ED173086 ED174479 ED175710 ED175711 ED175712 ED175714 ED175715 ED175716 ED175717 ED175718 ED175719 ED179374 ED179395 ED180791 ED180827 ED182180 ED184817 ED184869 ED186231 ED186281 ED187554 ED187555 ED187557 ED191743 ED191745 ED193063 ED194347* ED194353
ENERGY CONSERVATION	(9)	ED101937 ED129677 ED180803 ED180804 ED180805 ED183392 ED186282 ED193061 ED193062
*ENERGY EDUCATION	(38)	ED162886 ED166010 ED167409 ED167410 ED173072 ED173086 ED173158 ED174479 ED175710 ED175711 ED175712 ED175714 ED175715 ED175716 ED175717 ED175718 ED175719 ED179374 ED179375 ED179395 ED180791 ED180803 ED180804 ED180805 ED180827 ED183392 ED184869 ED186231 ED186281 ED186282 ED187554 ED187555 ED187557 ED191743 ED191745 ED193061 ED193062 ED194347*
ENERGY EDUCATION	(9)	ED173159 ED173160 ED173161 ED173162 ED173163 ED173164 ED173165 ED182145 ED182146
*ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION	(1)	ED129605
*ENGINEERING	(1)	ED166055
ENGINEERING DRAWING	(1)	ED127186
*ENGINEERING EDUCATION	(2)	ED119993 ED166055
ENGINEERING TECHNOLOGY	(1)	ED107897
*ENGINES	(2)	ED111621 ED111622
*ENGLISH	(1)	ED175719
ENGLISH	(7)	ED087912 ED087913 ED087914 ED087915 ED087916 ED091902 ED182107
*ENGLISH CURRICULUM	(2)	ED063464 ED063465
ENGLISH CURRICULUM	(2)	ED137538 ED141532
ENGLISH EDUCATION	(2)	ED077776 ED162897
ENGLISH INSTRUCTION	(1)	ED134742
*ENRICHMENT ACTIVITIES	(1)	ED135192
ENRICHMENT ACTIVITIES	(7)	ED024458 ED082927 ED094912 ED123055 ED134461 ED134462 ED182107
ENROLLMENT TRENDS	(1)	ED114148
*ENTOMOLOGY	(1)	ED082927

*ENVIRONMENT	(15)	ED047939	ED103241	ED107524	ED133146	ED137075	ED141158	ED175723
	ED178296	ED178297	ED178332	ED180808	ED180809	ED183368	ED183374	ED184875
ENVIRONMENT	(38)	ED044302	ED053945	ED093619	ED098067	ED106074	ED107518	ED108874
	ED108875	ED111610	ED127169	ED130116	ED133161	ED133162	ED141151	ED141161
	ED141163	ED164347	ED164350	ED164351	ED174442	ED175730	ED177014	ED178338
	ED178340	ED178344	ED178345	ED179375	ED180810	ED180811	ED180812	ED180813
	ED180814	ED182135	ED183363	ED184817	ED187554	ED187557	ED188946	
*ENVIRONMENTAL EDUCATION	(156)	ED042634	ED042635	ED042636	ED042638	ED042639	ED042640	ED042643
	ED045389	ED046715	ED053945	ED063162	ED064131	ED067299	ED068325	ED068366
	ED075217	ED075219	ED075221	ED079047	ED079141	ED080361	ED080366	ED082978
	ED085490	ED086502	ED086552	ED086554	ED086556	ED086557	ED089993	ED092358
	ED092389	ED092390	ED092391	ED093593	ED093594	ED093595	ED093596	ED093599
	ED093619	ED093649	ED093673	ED094912	ED096134	ED096142	ED096143	ED096144
	ED097209	ED097210	ED097213	ED097214	ED097215	ED097217	ED097221	ED098067
	ED098073	ED098098	ED099149	ED099188	ED099189	ED100637	ED100652	ED100653
	ED100654	ED100655	ED100656	ED100657	ED100658	ED100662	ED100663	ED100667
	ED100697	ED100698	ED100777	ED101937	ED101939	ED101942	ED101959	ED103234
	ED103235	ED103236	ED103237	ED103238	ED103239	ED103241	ED103243	ED103244
	ED103245	ED103246	ED103247	ED103248	ED103249	ED103250	ED103251	ED103252
	ED103253	ED104645	ED106074	ED108874	ED108890	ED123055	ED128031	ED128085
	ED129677	ED133162	ED161727	ED162851	ED162856	ED162897	ED166009	ED166010
	ED166014	ED166015	ED167421	ED170141	ED173086	ED174479	ED175712	ED175723
	ED175730	ED177012	ED177013	ED177014	ED177015	ED178296	ED178297	ED179375
	ED179791	ED180803	ED180804	ED180805	ED180808	ED180809	ED180810	ED180811
	ED180812	ED180813	ED180814	ED182135	ED183363	ED183368	ED183374	ED184817
	ED184869	ED184875	ED187557	ED193048	ED193052	ED193062	ED193068	ED194302
	ED195389	ED196731	ED196735	ED198012	ED198013			
ENVIRONMENTAL EDUCATION	(81)	ED046735	ED047939	ED061060	ED062164	ED067218	ED068310	ED068367
	ED068368	ED070588	ED073929	ED073930	ED079099	ED081609	ED081610	ED081611
	ED086552	ED086553	ED086555	ED089899	ED096131	ED096138	ED096139	ED103233
	ED106088	ED106089#	ED108940	ED111662	ED111663	ED111664	ED133146	ED133161
	ED137063	ED159022	ED162915	ED164347	ED164348	ED164349	ED164350	ED164352
	ED164354	ED166011	ED166012	ED166013	ED173072	ED173158	ED173159	ED173160
	ED173163	ED173164	ED173165	ED174442	ED175714	ED175716	ED178341	ED179351
	ED179352	ED179353	ED179354	ED179355	ED179356	ED179357	ED179358	ED179374
	ED183392	ED186231	ED186281	ED187517#	ED187554	ED190360	ED190361	ED190362
	ED190363	ED190400	ED193056	ED193061	ED194325	ED194347#	ED194353	ED198010
	ED198011	ED198014						
*ENVIRONMENTAL INFLUENCES	(14)	ED071264	ED071265	ED071266	ED071267	ED087138	ED087139	ED096139
	ED098067	ED127197	ED162915	ED175723	ED178296	ED178297	ED178338	
ENVIRONMENTAL INFLUENCES	(8)	ED062164	ED142488	ED142489	ED179375	ED190379	ED190380	ED190381
	ED190382							
*ENVIRONMENTAL PROBLEMS	(1)	ED193048						
ENVIRONMENTAL RESEARCH	(1)	ED100777						
EPOCH	(1)	ED046215						
*EQUIPMENT	(1)	ED080361						
ERDA	(1)	ED129605						
ESEA TITLE I	(5)	ED068310	ED068367	ED074202	ED093699	ED093700		
ESEA TITLE III	(32)	ED034676	ED042622	ED042634	ED042635	ED042638	ED042643	ED042645
	ED045341	ED046715	ED046735	ED047939	ED061060	ED066505	ED066506	ED066507
	ED067299	ED068325	ED077737	ED077738	ED079047	ED079099	ED081193	ED086500
	ED086502	ED086553	ED086554	ED086555	ED086556	ED086557	ED096137	ED103244

		ED089483 ED091222 ED092389 ED092390 ED092391 ED093593 ED093594 ED093595 ED093596 ED093599 ED093641 ED093649 ED097209 ED097210 ED097213 ED097214 ED097215 ED097217 ED097221 ED098067 ED098073 ED100653 ED100654 ED100655 ED100656 ED100657 ED100658 ED100662 ED100663 ED100667 ED100697 ED100698 ED100709 ED100710 ED101937 ED101939 ED106088 ED106089* ED124370 ED124373 ED124374 ED124376 ED124379 ED124380 ED124381 ED124384 ED124393 ED133146 ED133161 ED133162 ED141175
ESEA TITLE VII	(1)	ED087623
E.S.S.	(1)	ED068465
ESTUARIES	(1)	ED198010
ETHNIC STUDIES	(1)	ED116995
*ETHNOLOGY	(1)	ED198013
*EVALUATION	(4)	ED028101 ED040039 ED120018 ED178267
EVALUATION	(3)	ED071888 ED039984 ED182138
*EVALUATION FOR INDIVIDUALIZED INSTRUCTION PROJECT	(3)	ED066505 ED066506 ED066507
*EVOLUTION	(3)	ED079139 ED086526 ED095026
*EXCEPTIONAL CHILD EDUCATION	(18)	ED046168 ED060587 ED060588 ED071264 ED071265 ED071266 ED071267 ED075976 ED079881 ED087188 ED087189 ED088244 ED089483 ED091902 ED094514 ED095695 ED180814 ED183563
EXCEPTIONAL CHILD EDUCATION	(8)	ED097217 ED100078 ED100079 ED109849 ED109850 ED112632 ED115032 ED136509
*EXERCISE (PHYSIOLOGY)	(1)	ED080476
*EXHIBITS	(1)	ED046215
EXPERIENTIAL LEARNING	(2)	ED162851 ED166009
*EXPERIMENTAL CURRICULUM	(1)	ED127164
EXPERIMENTAL CURRICULUM	(28)	ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184 ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197
EXPERIMENTAL PROGRAMS	(2)	ED184873 ED184874
*EXPERIMENTAL TEACHING	(1)	ED071884
EXPERIMENTS	(1)	ED168806
EXPOSITORY WRITING	(1)	ED178332
*FACILITY GUIDELINES	(1)	ED136444
FACILITY PLANNING	(1)	ED136444
*FACILITY REQUIREMENTS	(1)	ED136444
FAIRFAX COUNTY SCHOOLS	(1)	ED108943
*FAMILY LIFE	(1)	ED128080

FAMILY LIFE EDUCATION	(1)	ED091902
FAMILY (SOCIOLOGICAL UNIT)	(1)	ED101012#
FARM MECHANICS (OCCUPATION)	(1)	ED130116
FEDERAL PROGRAMS	(1)	ED074202
*FIELD INSTRUCTION	(2)	ED108874 ED108875
*FIELD STUDIES	(6)	ED067299 ED080366 ED103251 ED178339 ED178340 ED178341
FIELD STUDIES	(6)	ED067218 ED070588 ED086490 ED093619 ED095027 ED178342
*FIELD TRIPS	(4)	ED042635 ED193050 ED194302 ED198014
FIELD TRIPS	(18)	ED070588 ED073929 ED073930 ED128245 ED136061 ED142488 ED142489 ED174472 ED178338 ED178340 ED178341 ED178342 ED178345 ED180811 ED180812 ED180813 ED193020 ED193052
FILMS	(1)	ED062177
*FINE ARTS	(1)	ED042634
FINE ARTS	(6)	ED136061 ED137538 ED141499 ED141500 ED141501 ED173072
FIRST AID	(1)	ED087623
*FISH	(1)	ED141145
FISH	(1)	ED103238
FISHERIES	(1)	ED193020
FLEXIBLE FACILITIES	(1)	ED136444
FLIES	(1)	ED141154
FLORIDA	(2)	ED079881 ED091902
*FOOD	(1)	ED080359
FOOD	(1)	ED128085
FORCE	(6)	ED071882 ED071883 ED071884 ED071885 ED071886 ED096549
FOREIGN COUNTRIES	(1)	ED162250
*FORESTRY	(2)	ED097221 ED106606
*FORESTRY OCCUPATIONS	(1)	ED106606
FORESTRY OCCUPATIONS	(1)	ED130116
*FORESTS	(1)	ED195389
FORTRAN IV	(1)	ED081193
FOSSILS	(1)	ED141150
FRACTIONS	(1)	ED127190
*FRACTURE MECHANICS	(1)	ED166055

*FUEL CONSUMPTION	(3)	ED179374 ED179395 ED191745
FUEL CONSUMPTION	(10)	ED101959 ED173072 ED175715 ED179351 ED186281 ED186282 ED187554 ED187555 ED187557 ED191743
*FUELS	(6)	ED107517 ED179374 ED179375 ED186281 ED187554 ED187557
FUELS	(7)	ED173072 ED173164 ED175715 ED179395 ED180804 ED180805 ED187555
*FUNDAMENTAL CONCEPTS	(4)	ED068325 ED093594 ED111615 ED111616
FUNDAMENTAL CONCEPTS	(1)	ED079099
FURNITURE	(1)	ED136444
*FUSED CURRICULUM	(9)	ED040086 ED040087 ED040088 ED053945 ED053981 ED053982 ED141499 ED141500 ED141501
FUSED CURRICULUM	(4)	ED136061 ED137538 ED141531 ED141532
*FUTURES (OF SOCIETY)	(1)	ED128294
*GAMES	(1)	ED126891
GAME THEORY	(1)	ED126891
*GENERAL EDUCATION	(4)	ED070907 ED070909 ED070912 ED070916
GENERAL EDUCATION	(2)	ED025436 ED114148
*GENERAL SCIENCE	(10)	ED093575 ED093694 ED096124 ED096126 ED096128 ED096129 ED096152 ED102328 ED129610 ED129611
GENERAL SCIENCE	(13)	ED024458 ED042622 ED064043 ED064044 ED083044 ED091174 ED091175 ED093687 ED093700 ED127160 ED134461 ED134462 ED191692
*GENETICS	(9)	ED062179 ED080372 ED096146 ED096147 ED103237 ED182172 ED190356 ED190357 ED190358
GENETICS	(4)	ED052607 ED079139 ED134423 ED190359
GEOGRAPHIC CONCEPTS	(1)	ED128244
GEOGRAPHIC LOCATION	(1)	ED128244
GEOGRAPHIC REGIONS	(1)	ED128245
*GEOGRAPHY	(1)	ED198013
GEOGRAPHY	(5)	ED128244 ED128245 ED135192 ED177014 ED187554
*GEOGRAPHY INSTRUCTION	(3)	ED125934 ED128244 ED128245
*GEOLOGY	(16)	ED075221 ED079139 ED090032 ED093596 ED097214 ED141156 ED178340 ED178342 ED178343 ED179356 ED179358 ED190372 ED190373 ED190374 ED190375 ED198010
GEOLOGY	(11)	ED021745 ED079047 ED086524 ED092357 ED094956 ED141175 ED178339 ED178341 ED178345 ED179357 ED198011
*GEOMETRIC CONCEPTS	(3)	ED127170 ED127178 ED127189
GEOMETRIC CONCEPTS	(1)	ED127186

GEOMETRY (2) ED127189 ED177014
*GEOPHYSICS (1) ED178342

GEORGIA (1) ED094514

*GIFTED (7) ED060587 ED060588 ED112632 ED135192 ED136509 ED140601 ED182107

GLOBAL APPROACH (1) ED187517

*GLOBES (1) ED128244

*GOVERNMENT PUBLICATIONS (1) ED107519

*GOVERNMENT ROLE (2) ED111625 ED111626

*GRADE 1 (2) ED087916 ED188929

GRADE 1 (7) ED052067 ED092389 ED100653 ED110768 ED114523 ED141531 ED174442

GRADE 10 (7) ED063464 ED081611 ED086837 ED096131 ED096141 ED114677 ED141532

GRADE 11 (3) ED063465 ED086837 ED141532

GRADE 12 (2) ED086837 ED141532

*GRADE 2 (3) ED087915 ED188930 ED190401

GRADE 2 (9) ED052067 ED073929 ED092389 ED093699 ED100654 ED110768 ED111661
ED114523 ED141531

*GRADE 3 (2) ED087914 ED188931

GRADE 3 (8) ED052067 ED073929 ED092390 ED100655 ED110768 ED114523 ED141531
ED164348

*GRADE 4 (6) ED068367 ED087913 ED180803 ED180804 ED180805 ED188932

GRADE 4 (9) ED073929 ED081609 ED092390 ED100656 ED110769 ED114523 ED141531
ED182180 ED195391

*GRADE 5 (5) ED068368 ED094912 ED112187 ED118963 ED188933

GRADE 5 (9) ED073930 ED092391 ED100657 ED106606 ED110769 ED114523 ED137063
ED182180 ED195391

*GRADE 6 (5) ED068310 ED091174 ED112187 ED118963 ED188934

GRADE 6 (6) ED073930 ED092391 ED100658 ED110769 ED114523 ED193050

GRADE 7 (9) ED070766 ED072642 ED081610 ED091175 ED096113 ED101942 ED107764
ED107777 ED107824

*GRADE 8 (1) ED089037

GRADE 8 (2) ED096113 ED107824

*GRADE 9 (1) ED093700

GRADE 9 (33) ED096113 ED107764 ED107824 ED114677 ED141532 ED188862 ED190356
ED190357 ED190358 ED190359 ED190360 ED190361 ED190362 ED190363 ED190364
ED190365 ED190366 ED190367 ED190368 ED190369 ED190370 ED190371 ED190372
ED190373 ED190374 ED190375 ED190376 ED190377 ED190378 ED190379 ED190380
ED190381 ED190382

GRADING (1) ED070671
*GRAPHICAL KINEMATICS (1) ED096549

*GRAPHS (2) ED096123 ED096125

GRAPHS (3) ED103252 ED127187 ED127193

GUIDANCE OBJECTIVES (1) ED114523

*GUIDELINES (6) ED068325 ED091902 ED173181 ED176993 ED186247 ED193080

GUIDELINES (9) ED046168 ED065289 ED071264 ED071265 ED071266 ED071267 ED119942*
ED180838 ED187517*

*GUIDES (1) ED138463

GUIDES (4) ED086502 ED089993 ED104689 ED116995

*HANDICAPPED (1) ED134408

*HANDICAPPED CHILDREN (2) ED115032 ED136530

HANDICAPPED CHILDREN (1) ED088244

HANDICAPPED STUDENTS (1) ED100061

HANDICRAFTS (1) ED136530

HANDWRITING (1) ED100078

*HANOVER SCHOOL SYSTEM (1) ED077776

HARVARD PROJECT PHYSICS (35) ED071882 ED071883 ED071884 ED071885 ED071886 ED071887 ED071888
ED071889 ED071890 ED071891 ED071892 ED071893 ED071894 ED071895 ED071896
ED071897 ED071898 ED071899 ED071900 ED071901 ED071902 ED071903 ED071904
ED071905 ED071906 ED071907 ED071908 ED071909 ED071910 ED071911 ED071912
ED071913 ED071914 ED071915 ED071916

*HAWAII (1) ED114148

HEALTH (9) ED079881 ED091173 ED109849 ED109850 ED110769 ED114466 ED114467
ED140569 ED188946

*HEALTH EDUCATION (3) ED096149 ED096150 ED188870

HEALTH EDUCATION (9) ED070907 ED075976 ED077776 ED089483 ED091902 ED096417 ED136061
ED174479 ED188937

*HEARING IMPAIRMENTS (1) ED196721

*HEAT (2) ED124373 ED196656

HEAT (4) ED071892 ED071893 ED167409 ED183392

*HEATING (1) ED173164

HEATING (1) ED159022

HEREDITY (5) ED096146 ED190356 ED190357 ED190358 ED190359

HIGHER EDUCATION (7) ED128244 ED128245 ED175723 ED190400 ED191660 ED194302 ED196721

*HIGH SCHOOL CURRICULUM (4) ED054118 ED089740 ED107897 ED130058

HIGH SCHOOLS	(3)	ED013295 ED166014 ED191676
HIGH SCHOOL STUDENTS	(2)	ED089740 ED107200
*HISTORY	(1)	ED187555
HISTORY	(9)	ED111630 ED140601 ED164352 ED164354 ED173072 ED173163 ED179374 ED179375 ED180801
HOBBIES	(1)	ED117566
HOLIDAYS	(1)	ED128081
HOME ECONOMICS	(5)	ED129677 ED136061 ED179395 ED191743 ED191745
*HOME ECONOMICS EDUCATION	(1)	ED177012
*HORTICULTURE	(1)	ED013295
HORTICULTURE	(1)	ED130116
*HUMAN BODY	(8)	ED092356 ED096149 ED096150 ED130903 ED190364 ED190365 ED190366 ED190367
HUMAN BODY	(4)	ED070907 ED070912 ED111631 ED111632
*HUMAN DEVELOPMENT	(1)	ED093576
HUMAN DEVELOPMENT	(3)	ED086522 ED096149 ED096150
*HUMAN ENGINEERING	(2)	ED091217 ED128294
HUMAN GEOGRAPHY	(3)	ED128245 ED142488 ED142489
HUMANITIES	(1)	ED082978
*HUNTINGTON COMPUTER PROJECT	(1)	ED089740
HYPOTHESIS TESTING	(1)	ED101013
IBM 1130 COMPUTER	(1)	ED081193
ICE	(1)	ED103249
IDAHO	(1)	ED136061
ILLINOIS	(1)	ED130116
ILLUSTRATIONS	(3)	ED058455 ED058456 ED125934
IMPROVEMENT PROGRAMS	(1)	ED190356
*INDEPENDENT STUDY	(5)	ED070907 ED070909 ED070912 ED070916 ED112632
INDEPENDENT STUDY	(1)	ED086837
*INDIVIDUAL ACTIVITIES	(1)	ED115032
INDIVIDUAL CHARACTERISTICS	(1)	ED112632
*INDIVIDUAL DEVELOPMENT	(2)	ED141531 ED141532
INDIVIDUAL DEVELOPMENT	(1)	ED107777

*INDIVIDUALIZED CURRICULUM (3) ED131291 ED131292 ED131293

INDIVIDUALIZED CURRICULUM (1) ED131294

*INDIVIDUALIZED INSTRUCTION (33) ED066505 ED066506 ED066507 ED070673 ED070675 ED080332 ED080333
ED086476 ED086477 ED086478 ED086479 ED086480 ED088244 ED089984 ED091176
ED091222 ED095024 ED095025 ED095026 ED095027 ED095028 ED095029 ED120848
ED190357 ED190358 ED190359 ED190360 ED190361 ED190362 ED190376 ED190379
ED190380 ED190381

INDIVIDUALIZED INSTRUCTION (57) ED070671 ED070672 ED070674 ED071912 ED071913 ED071914 ED071915
ED071916 ED089899 ED091177 ED093694 ED095017 ED098066 ED099496 ED099497
ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505
ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512 ED115082
ED124370 ED124373 ED124374 ED124376 ED124379 ED124380 ED124381 ED130901
ED130903 ED190356 ED190363 ED190364 ED190365 ED190366 ED190367 ED190368
ED190369 ED190370 ED190371 ED190372 ED190373 ED190374 ED190375 ED190377
ED190378 ED190382

*INDIVIDUALIZED PROGRAMS (4) ED070671 ED070672 ED070674 ED178267

INDIVIDUALIZED PROGRAMS (19) ED070673 ED070675 ED099496 ED099497 ED099498 ED099499 ED099500
ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508
ED099599 ED099510 ED099511 ED099512

INDIVIDUAL TESTS (1) ED099496

INDUSTRIAL ARTS (5) ED100061 ED136061 ED137538 ED162897 ED179395

*INDUSTRIAL EDUCATION (2) ED058455 ED058456

INDUSTRIAL EDUCATION (18) ED063464 ED096417 ED099497 ED099498 ED099499 ED099500 ED099501
ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509
ED099510 ED099511 ED099512

INDUSTRY (4) ED190360 ED190361 ED190362 ED190363

INFORMATION ANALYSIS PRODUCTS (1) ED173072

INFORMATION SOURCES (3) ED113176 ED126891 ED162386

INFORMATION SYSTEMS (1) ED107769

INFORMATION UTILIZATION (1) ED107769

*INQUIRY (2) ED191694# ED194806

INQUIRY (1) ED179402

*INQUIRY TRAINING (2) ED037343 ED120018

INQUIRY TRAINING (7) ED071264 ED071265 ED071266 ED071267 ED087188 ED087189 ED093641

*INSERVICE EDUCATION (1) ED188947

INSERVICE TEACHER EDUCATION (4) ED086230# ED107200 ED136061 ED178267

*INSTITUTE FOR ENVIRONMENTAL EDUCATION (1) ED093619

INSTITUTIONS (1) ED101012#

*INSTRUCTION (11) ED042636 ED042638 ED042639 ED042640 ED042643 ED062177 ED064042
ED084081 ED121613 ED162894 ED180743

INSTRUCTION (101) ED025436 ED040086 ED040087 ED040088 ED042634 ED045341 ED045381
ED059900 ED062179 ED064044 ED064068 ED065289 ED065362 ED077737 ED077738
ED079024 ED079025 ED079026 ED079027 ED079028 ED079029 ED079030 ED079031
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ED090032 ED090033 ED091233 ED092356 ED092357 ED092358 ED093599 ED093619
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*INSTRUCTIONAL AIDS (3) ED065293 ED106164 ED128244

INSTRUCTIONAL AIDS (6) ED063465 ED086526 ED086528 ED087913 ED087914 ED111662

INSTRUCTIONAL DESIGN (1) ED054939

INSTRUCTIONAL FILMS (4) ED086519 ED086523 ED086526 ED086528

*INSTRUCTIONAL IMPROVEMENT (1) ED104689

INSTRUCTIONAL IMPROVEMENT (2) ED079138 ED079140

*INSTRUCTIONAL INNOVATION (2) ED079138 ED079140

*INSTRUCTIONAL MATERIALS (262) ED021745 ED021746 ED022690 ED025429 ED032236 ED034676 ED040047
ED040086 ED040087 ED040088 ED040089 ED042622 ED042634 ED042636 ED042638
ED042639 ED042640 ED042643 ED042645 ED045341 ED045380 ED045381 ED045417
ED046715 ED046735 ED047959 ED052000 ED052001 ED052002 ED052003 ED052004
ED052005 ED052667 ED053945 ED053981 ED053982 ED061060 ED064963 ED070671
ED070675 ED071882 ED071886 ED071892 ED071896 ED071897 ED071912 ED071913
ED071914 ED071915 ED071916 ED079047 ED079054 ED079055 ED079056 ED083045
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INSTRUCTIONAL MATERIALS (242) ED042635 ED058455 ED058456 ED062164 ED064095 ED064096 ED064097
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*INSTRUCTIONAL MEDIA (1) ED126891

INSTRUCTIONAL MEDIA (1) ED046215

INSTRUCTIONAL PROGRAM DIVISIONS (2) ED073929 ED073930

*INSTRUCTIONAL PROGRAMS (2) ED100061 ED136509

INSTRUCTIONAL PROGRAMS (1) ED114148

*INSTRUCTIONAL TRIPS (1) ED046215

INSTRUCTION CURRICULUM ENVIRONMENT (2) ED100697. ED100698

*INSTRUMENTATION (1) ED120018

*INTEGRATED ACTIVITIES (2) ED095294 ED110769

INTEGRATED ACTIVITIES (4) ED082927 ED083045 ED110768 ED134742

*INTEGRATED CURRICULUM (22) ED053945 ED053981 ED064095 ED064096 ED096417 ED110768 ED118758
ED134422 ED134423 ED134424 ED134425 ED134426 ED188937 ED188938 ED188939
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INTEGRATED CURRICULUM (14) ED053962 ED064697 ED089981 ED102323 ED106606 ED107897 ED110769
ED114466 ED114467 ED114523 ED114677 ED117325 ED118963 ED182185

INTELLECTUAL DISCIPLINES (1) ED114148

INTERACTIVE LRNG SYST GUIDANCE OCCUPL INFO (1) ED107769
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INTERACTIVE SYSTEMS (1) ED107200

*INTERDISCIPLINARY APPROACH	(67)	ED022690	ED022691	ED063162	ED063465	ED064043	ED064044	ED064097
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	ED108875	ED127164	ED127165	ED127169	ED127170	ED127171	ED127172	ED127173
	ED127174	ED127175	ED127176	ED127177	ED127178	ED127179	ED127180	ED127181
	ED127183	ED127185	ED127186	ED127187	ED127188	ED127189	ED127190	ED127191
	ED127192	ED127193	ED127194	ED127195	ED127196	ED127197	ED128294	ED166010
	ED166012	ED166013	ED166014	ED174479	ED175711	ED177012	ED177013	ED177015
	ED179351	ED179374	ED179375	ED179395	ED180801	ED184817	ED188870	ED191745
	ED193061	ED196673	ED196674	ED196675				
INTERDISCIPLINARY APPROACH	(67)	ED040086	ED040087	ED040088	ED042639	ED042640	ED053945	ED053981
	ED053982	ED063464	ED064042	ED064095	ED064096	ED080366	ED092389	ED092390
	ED092391	ED095294	ED098073	ED098098	ED100652	ED100653	ED100654	ED100655
	ED100656	ED100657	ED100658	ED100662	ED100663	ED100667	ED100697	ED100698
	ED101942	ED101959	ED107513	ED108890	ED111664	ED116995	ED127184	ED142488
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	ED183368	ED183374	ED183392	ED187517#	ED187554	ED187555	ED191743	ED193074
	ED194347#	ED194353	ED196676	ED198013				
INTEREST TESTS	(1)	ED101012#						
*INTERMEDIATE GRADES	(4)	ED060588	ED097213	ED114467	ED179351			
INTERMEDIATE GRADES	(16)	ED064131	ED093594	ED093596	ED097221	ED103234	ED103236	ED103237
	ED103238	ED103239	ED103247	ED103251	ED103253	ED118963	ED127165	ED134461
	ED198010							
*INTERMEDIATE SCIENCE CURRICULUM STUDY	(26)	ED178267	ED190358	ED190359	ED190360	ED190361	ED190362	ED190363
	ED190364	ED190365	ED190366	ED190367	ED190368	ED190369	ED190370	ED190371
	ED190372	ED190373	ED190374	ED190375	ED190376	ED190377	ED190378	ED190379
	ED190380	ED190381	ED190382					
INTERMEDIATE SCIENCE CURRICULUM STUDY	(2)	ED190356	ED190357					
*INTERNATIONAL PROGRAMS	(2)	ED111617	ED111618					
INTERNATIONAL SPACE PROGRAMS	(2)	ED111617	ED111618					
INTERPERSONAL COMPETENCE	(1)	ED100079						
INTERVIEWS	(1)	ED162250						
INTRODUCTORY PHYSICAL SCIENCE	(1)	ED188862						
INVESTIGATING SCIENCE WITH CHILDREN	(1)	ED021745						
*INVESTIGATIONS	(4)	ED079099	ED081609	ED081610	ED081611			
INVESTIGATIONS	(18)	ED067299	ED103233	ED103234	ED103237	ED103238	ED103239	ED103241
	ED103243	ED103244	ED103245	ED103246	ED103247	ED103248	ED103249	ED103250
	ED103251	ED103252	ED103253					
IOWA	(1)	ED095294						
*ITEM BANKS	(3)	ED066505	ED066506	ED066507				
*JACKS (LIFTS)	(1)	ED131291						
JACKS (LIFTS)	(1)	ED131294						
JOBS	(1)	ED107824						
JOB SKILLS	(1)	ED109849						

*JUNIOR COLLEGES (1) ED114148
*JUNIOR HIGH SCHOOLS (10) ED066507 ED068277 ED072042 ED107513 ED107824 ED166011 ED166012
ED166013 ED166014 ED166015

JUNIOR HIGH SCHOOLS (61) ED086230# ED100057 ED102328 ED103234 ED103236 ED103237 ED103238
ED103239 ED103247 ED103251 ED103253 ED107764 ED107769 ED107777 ED119993
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*JUNIOR HIGH SCHOOL STUDENTS (5) ED086524 ED093576 ED093687 ED096113 ED133161

JUNIOR HIGH SCHOOL STUDENTS (9) ED089981 ED096132# ED130901 ED130903 ED133162 ED142488 ED142489
ED180812 ED196656

*KINDERGARTEN (6) ED071772 ED084016 ED087912 ED093687 ED100652 ED187573

KINDERGARTEN (9) ED042634 ED052067 ED079054 ED110768 ED114523 ED132044 ED141531
ED164349 ED173181

KINETIC MOLECULAR THEORY (9) ED071892 ED071893 ED071894 ED071895 ED071896 ED079055 ED086520
ED093655 ED134424

*KINETICS (2) ED071892 ED071893

KINETICS (5) ED071882 ED071883 ED071884 ED071885 ED071886

*KNOWLEDGE LEVEL (1) ED125934

*LABORATORY EXPERIMENTS (6) ED071884 ED071899 ED100684 ED118430 ED175710 ED194306

LABORATORY EXPERIMENTS (16) ED021745 ED021746 ED046713 ED071894 ED071899 ED071904 ED071909
ED089041 ED091217 ED094956 ED097195 ED106104 ED131291 ED131292 ED131293
ED196667

*LABORATORY MANUALS (27) ED071894 ED071899 ED071904 ED071909 ED080359 ED175710 ED182145
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ED190377 ED190378 ED190379 ED190400

LABORATORY MANUALS (20) ED025429 ED071899 ED080374 ED106089# ED131291 ED131292 ED131293
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ED190373 ED190380 ED190381 ED190382 ED193089

*LABORATORY PROCEDURES (14) ED070673 ED161752 ED174475 ED178307 ED190364 ED190365 ED190368
ED190369 ED190373 ED190379 ED190381 ED190382 ED191660 ED193020

LABORATORY PROCEDURES (33) ED042622 ED052000 ED052001 ED052002 ED052003 ED052004 ED052005
ED062177 ED086523 ED091217 ED138463 ED174472 ED174473 ED174474 ED178306
ED178344 ED182145 ED182146 ED190356 ED190357 ED190359 ED190360 ED190361
ED190362 ED190363 ED190366 ED190370 ED190371 ED190372 ED190374 ED190375
ED190376 ED190379

*LABORATORY SAFETY (4) ED138463 ED168306 ED174474 ED174475

LABORATORY SAFETY (4) ED173181 ED174472 ED174473 ED196667

*LABORATORY TECHNIQUES (1) ED028097

LABORATORY TECHNIQUES (1) ED044302

LAND USE (3) ED128245 ED179375 ED183368

*LANGUAGE ARTS (8) ED109849 ED109850 ED141142 ED175715 ED175717 ED175719 ED187554
ED190401

LANGUAGE ARTS (34) ED063162 ED075976 ED089899 ED091902 ED093673 ED100061 ED101959
ED108875 ED110769 ED114466 ED114467 ED114677 ED118963 ED136580 ED137538
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ED182107 ED183368 ED194947#

LANGUAGE DEVELOPMENT (1) ED079881

*LANGUAGE HANDICAPPED (1) ED089483

LANGUAGE INSTRUCTION (1) ED134742

LANGUAGES (1) ED141532

LAP (6) ED095024 ED095025 ED095026 ED095027 ED095028 ED095029

*LEARNING (1) ED059900

*LEARNING ACTIVITIES (75) ED064131 ED067218 ED068310 ED068366 ED068367 ED068368 ED070672
ED070673 ED070674 ED073929 ED073930 ED075217 ED075219 ED075221 ED080366
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ED130958 ED130116 ED131291 ED131294 ED134742 ED136061 ED136509 ED137063
ED137538 ED139522 ED140601 ED141499 ED141500 ED141501 ED141531 ED141532
ED142488 ED142489 ED161727 ED195389

LEARNING ACTIVITIES (86) ED061060 ED062164 ED063162 ED063464 ED067299 ED070675 ED079099
ED080361 ED081609 ED081610 ED081611 ED091233 ED093593 ED093594 ED093595
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*LEARNING ACTIVITY PACKAGE (1) ED098066

LEARNING ACTIVITY PACKAGE (6) ED095024 ED095025 ED095026 ED095027 ED095028 ED095029

LEARNING ACTIVITY PACKAGES (5) ED070671 ED070672 ED070673 ED070674 ED070675

*LEARNING DISABILITIES (3) ED100078 ED100079 ED140569

LEARNING DISABILITIES (3) ED089483 ED093694 ED096115

LEARNING HIERARCHIES (1) ED059900

*LEARNING LABORATORIES (1) ED084016

LEARNING LABORATORIES (1) ED123564

*LEARNING MODULES (4) ED180778 ED180803 ED180804 ED180805

LEARNING MODULES	(4)	ED136061 ED136509 ED188870 ED188947
LEARNING PROCESSES	(1)	ED126891
LEARNING STATIONS	(1)	ED108874
LEGAL EDUCATION	(1)	ED140601
*LEGAL RESPONSIBILITY	(1)	ED034697
*LESSON PLANS	(6)	ED064068 ED134742 ED173159 ED173160 ED173161 ED173163
LESSON PLANS	(20)	ED024458 ED063464 ED068310 ED068367 ED068368 ED071264 ED071265 ED071266 ED071267 ED082978 ED094958 ED107513 ED127172 ED130658 ED130116 ED173162 ED179352 ED179353 ED179354 ED179355
LIBRARIES	(1)	ED095695
LIBRARY COLLECTIONS	(1)	ED107777
*LIBRARY MATERIAL SELECTION	(1)	ED113176
*LIFE STYLE	(1)	ED173086
LIFE STYLE	(1)	ED097215
*LIGHT	(5)	ED071898 ED103248 ED188925 ED196657 ED196670
LIGHT	(7)	ED071897 ED071899 ED093622 ED093658 ED124384 ED1[illegible]8244 ED167409
*LIMNOLOGY	(1)	ED190400
LIMNOLOGY	(1)	ED193052
LINEAR PROGRAMING	(2)	ED188938 ED188939
LITERATURE	(1)	ED190401
LITERATURE REVIEWS	(1)	ED101013
*LIVESTOCK	(1)	ED128082
*LOBSTER	(1)	ED164350
LOUISIANA	(4)	ED091222 ED117565 ED117566 ED117567
LOW ABILITY STUDENTS	(3)	ED075441 ED096137 ED096139
*LOW VISION AIDS	(1)	ED191660
LUNA	(1)	ED107200
*LUNAR RESEARCH	(1)	ED070672
LUNAR RESEARCH	(1)	ED070673
*MAGNETS	(1)	ED091176
MAGNETS	(4)	ED071897 ED071898 ED071900 ED093699
*MAINTENANCE	(1)	ED193020
MANAGEMENT GAMES	(1)	ED126891

MANUALS	(4)	ED028097 ED052607 ED052608 ED082978
*MAPPING	(1)	ED103236
*MAPS	(3)	ED196674 ED196675 ED196676
MAPS	(3)	ED125934 ED127196 ED179351
*MAP SKILLS	(4)	ED125934 ED196674 ED196675 ED196676
*MARINE BIOLOGY	(31)	ED054118 ED086552 ED086553 ED086554 ED086555 ED086556 ED086557 ED141083 ED141084 ED141085 ED141086 ED141145 ED141152 ED141153 ED141154 ED141155 ED141158 ED141160 ED162915 ED164350 ED164354 ED167421 ED174442 ED184875 ED193020 ED193652 ED194302 ED194306 ED194325 ED198012 ED198914
MARINE BIOLOGY	(15)	ED042622 ED046715 ED086490 ED138462 ED141150 ED164347 ED164349 ED177012 ED177013 ED177015 ED178296 ED178297 ED187517# ED198010 ED198913
*MARINE EDUCATION	(1)	ED194325
MARINE TECHNICIANS	(1)	ED164353
MARKETING	(1)	ED128085
*MARSHES	(1)	ED141155
MARYLAND	(1)	ED136444
MARYLAND (FREDERICK COUNTY)	(2)	ED130901 ED130903
MASTERY LEARNING	(1)	ED182181
MATERIAL DEVELOPMENT	(1)	ED107200
*MATHEMATICAL APPLICATIONS	(2)	ED083045 ED190367
MATHEMATICAL APPLICATIONS	(8)	ED071912 ED071913 ED071914 ED127165 ED128244 ED190364 ED190365 ED190366
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*MATHEMATICS CURRICULUM	(4)	ED182181 ED188938 ED188939 ED188940
MATHEMATICS CURRICULUM	(5)	ED136061 ED137508 ED141531 ED188937 ED188941
*MATHEMATICS EDUCATION	(5)	ED059900 ED103236 ED103252 ED177014 ED193061
MATHEMATICS EDUCATION	(46)	ED077776 ED083045 ED086230# ED107764 ED127164 ED127165 ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184 ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197 ED162897 ED164347 ED164353 ED173072 ED174479 ED177013 ED177015 ED179374 ED184817 ED191745 ED194353 ED196731
*MATHEMATICS INSTRUCTION	(1)	ED052608
MATHEMATICS INSTRUCTION	(5)	ED100057 ED107764 ED134742 ED182181 ED193061
*MATHEMATICS MATERIALS	(1)	ED107764
MATTER	(1)	ED021746

*MEASUREMENT	(16)	ED095029	ED096126	ED096128	ED096129	ED127173	ED127180	ED127184
	ED127190	ED190364	ED190365	ED190366	ED190367	ED190368	ED190369	ED190370
	ED190371							
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*MEASUREMENT INSTRUMENTS	(2)	ED080361	ED162250					
MEASUREMENT TECHNIQUES	(1)	ED116995						
*MECHANICAL EQUIPMENT	(1)	ED131294						
*MECHANICS (PHYSICS)	(3)	ED084016	ED091164	ED096549				
MECHANICS (PHYSICS)	(2)	ED093700	ED131291					
MECHANICS (PROCESS)	(1)	ED096549						
MEDIA RESEARCH	(1)	ED126891						
MENTAL HEALTH	(1)	ED100057						
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*MENTAL RETARDATION	(1)	ED180814						
*MERCHANDISE INFORMATION	(1)	ED089899						
METALS	(1)	ED091215						
*METEOROLOGY	(7)	ED075219	ED079025	ED090029	ED111610	ED178306	ED178338	ED180810
METEOROLOGY	(7)	ED045411	ED092557	ED093619	ED093700	ED107897	ED173160	ED183368
METHODS	(2)	ED111623	ED111624					
METHODS COURSES	(1)	ED086230#						
METRIC SYSTEM	(3)	ED096126	ED096128	ED096129				
*MICROBIOLOGY	(5)	ED060588	ED079140	ED096140	ED130901	ED141154		
*MIDDLE SCHOOLS	(15)	ED093694	ED096124	ED096126	ED096128	ED096129	ED096133	ED096142
	ED096145	ED096152	ED166011	ED166012	ED166013	ED166015	ED183392	ED187554
MIDDLE SCHOOLS	(8)	ED089981	ED116995	ED141499	ED142488	ED142489	ED166010	ED166014
	ED184869							
*MILITARY AIR FACILITIES	(2)	ED111627	ED111628					
MILITARY ORGANIZATIONS	(2)	ED111619	ED111620					
*MILITARY PERSONNEL	(1)	ED100079						
MILITARY PERSONNEL	(1)	ED100078						
*MILITARY SCHOOLS	(4)	ED111613	ED111614	ED111619	ED111620			
MILITARY SCIENCE	(2)	ED111627	ED111628					
MILITARY TRAINING	(17)	ED099496	ED099497	ED099498	ED099499	ED099500	ED099501	ED099502

		ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512
MILWAUKEE PUBLIC SCHOOLS	(1)	ED093599
MINICOURSES	(2)	ED130901 ED130903
*MINNEMAST	(30)	ED127164 ED127165 ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184 ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197
MINNEMAST	(1)	ED103235
MINNESOTA	(3)	ED107769 ED167409 ED167410
*MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT	(30)	ED127164 ED127165 ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184 ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197
MINNESOTA MATHEMATICS AND SCIENCE TEACHING PROJECT	(1)	ED103235
MISSISSIPPI	(9)	ED175710 ED175711 ED175712 ED175714 ED175715 ED175716 ED175717 ED175718 ED175719
*MOBILE LABORATORIES	(1)	ED028097
MOBILE LABORATORIES	(1)	ED046215
*MODELS	(3)	ED025436 ED140601 ED141164
MODELS	(4)	ED100777 ED106105 ED141531 ED141532
MONEY MANAGEMENT	(1)	ED079881
*MONITORING	(1)	ED175723
*MOTION	(7)	ED071882 ED071883 ED071884 ED071885 ED071886 ED071887 ED096549
MOTION	(1)	ED134424
MOTIVATION	(2)	ED028101 ED101012*
MOTOR DEVELOPMENT	(2)	ED100078 ED136559
MULTIDISCIPLINARY SCIENCE CURRICULUM	(1)	ED089981
*MULTIMEDIA INSTRUCTION	(3)	ED071891 ED071906 ED071911
MULTIMEDIA INSTRUCTION	(3)	ED071896 ED071901 ED079047
MULTIPLE CHOICE TESTS	(4)	ED071888 ED071898 ED071903 ED071908
MULTIPLE DISABILITIES	(1)	ED196721
*MULTIPLICATION	(2)	ED127193 ED127195
MULTIPLICATION	(1)	ED127185
*MUNICIPALITIES	(1)	ED142489
*MUSEUMS	(2)	ED046215 ED188947

*MUSIC (1) ED095695
MUSIC (8) ED075976 ED079881 ED089483 ED100061 ED114467 ED135192 ED164348
ED182107

MUSIC ACTIVITIES (1) ED136530

MUSIC EDUCATION (1) ED177043

*MYCOLOGY (1) ED100684

MYTHOLOGY (1) ED140601

NASA (12) ED059866 ED091153 ED091154 ED091157 ED091164 ED091215 ED091216
ED091217 ED133197 ED133198 ED133199 ED133200

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (7) ED021745 ED021746 ED032236 ED133197 ED133198 ED133199 ED133200

*NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS (1) ED179402

*NATIONAL DEFENSE (4) ED111619 ED111620 ED111627 ED111628

NATIONAL DEFENSE (5) ED111610 ED111611 ED111613 ED111614 ED111629

NATIONAL DEFENSE EDUCATION ACT (1) ED011507

NATIONAL EDUCATION ASSOCIATION (2) ED021745 ED021746

*NATIONAL ORGANIZATIONS (2) ED111625 ED111626

*NATIONAL SCIENCE FOUNDATION (1) ED178267

NATIONAL SCIENCE FOUNDATION (13) ED022690 ED119993 ED123059 ED178338 ED178339 ED178340 ED178341
ED178342 ED178343 ED178344 ED178345 ED178346 ED178347

NATIONAL SCIENCE SUPERVISORS ASSOCIATION (1) ED028101

NATIONAL SCIENCE TEACHERS ASSOCIATION (8) ED021745 ED021746 ED024592 ED111662 ED111663 ED111664 ED178306
ED178307

*NATURAL RESOURCES (29) ED068367 ED068368 ED070588 ED079099 ED080366 ED100652 ED100653
ED100654 ED100655 ED100656 ED100657 ED100658 ED103241 ED106074 ED111662
ED111663 ED111664 ED133162 ED137075 ED138462 ED162897 ED174442 ED179358
ED179374 ED179375 ED190363 ED190373 ED190374 ED193048

NATURAL RESOURCES (104) ED045380 ED046785 ED064131 ED067218 ED068310 ED068366 ED073929
ED073930 ED075217 ED075219 ED075221 ED079047 ED081609 ED081610 ED081611
ED093593 ED093594 ED093596 ED094912 ED097210 ED097213 ED097214 ED097217
ED097221 ED098967 ED098973 ED099188 ED099189 ED100637 ED100662 ED100663
ED100667 ED100697 ED100698 ED101937 ED101939 ED101942 ED101959 ED103233
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ED175719 ED175730 ED178296 ED178297 ED178339 ED178344 ED178345 ED179357
ED179395 ED180791 ED180801 ED180808 ED180809 ED180810 ED180811 ED180812
ED180813 ED180814 ED182135 ED183374 ED183392 ED184817 ED184875 ED186281
ED187554 ED187555 ED187557 ED190360 ED190361 ED190362 ED190372 ED190375
ED191743

*NATURAL SCIENCES (7) ED093593 ED093594 ED093595 ED099189 ED123059 ED162897 ED162915

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NATURAL SCIENCES	(15)	ED052607 ED071772 ED086554 ED086555 ED086556. ED086557 ED089899 ED093596 ED093700 ED100057 ED100061 ED128081 ED128083 ED129610 ED129611
*NATURE CENTERS	(2)	ED104645 ED134408
NATURE TRAILS	(1)	ED134408
*NAVIGATION	(4)	ED111623 ED111624 ED125934 ED177014
NEBRASKA	(1)	ED089483
*NEEDS ASSESSMENT	(1)	ED119942*
NEGRO YOUTH	(1)	ED101013
NEWTON (ISAAC)	(1)	ED095017
*NEW YORK	(1)	ED137538
NEW YORK	(2)	ED108940 ED167424
NEW YORK CITY	(3)	ED091173 ED091174 ED091175
NEW YORK (NEW YORK)	(1)	ED137538
NONDISCRIMINATORY EDUCATION	(1)	ED130058
*NONFORMAL EDUCATION	(1)	ED119942*
NONFORMAL EDUCATION	(1)	ED175718
*NORTH CAROLINA	(1)	ED108875
NSF	(2)	ED119993 ED123059
NSTA	(3)	ED111662 ED111663 ED111664
*NUCLEAR ENERGY	(2)	ED107517 ED107518
NUCLEAR ENERGY	(1)	ED107519
*NUCLEAR PHYSICS	(20)	ED071907 ED071908 ED071909 ED071910 [illegible] ED086519 ED093659 ED106104 ED107517 ED107518 ED107519 ED107520 ED107522 ED107523 ED107524 ED121613 ED129605 ED168806 ED182145 ED182146
NUCLEAR PHYSICS	(3)	ED107521 ED186281 ED186282
NUCLEAR REACTORS	(3)	ED107520 ED107522 ED107523
*NUMBER CONCEPTS	(3)	ED127174 ED127177 ED127188
NUMBER CONCEPTS	(1)	ED127184
*NUMBER SYSTEMS	(4)	ED127179 ED127181 ED127184 ED127185
NUMBER SYSTEMS	(1)	ED127195
*NUTRITION	(2)	ED080359 ED188942
OAK TREES	(1)	ED103243
*OBJECTIVES	(9)	ED062177 ED062179 ED065289 ED070597 ED093673 ED166009 ED166010 ED166011 ED182138

OBJECTIVES	(20)	ED025436 ED079024 ED079026 ED079029 ED079030 ED079031 ED079134 ED079135 ED079137 ED084081 ED086502 ED101959 ED166012 ED166013 ED165014 ED166015 ED180838 ED182181 ED193069 ED196699
*OBSERVATION	(2)	ED103235 ED127176
OBSERVATION	(1)	ED127172
*OCCUPATIONAL CLUSTERS	(3)	ED107769 ED107824 ED130116
OCCUPATIONAL CLUSTERS	(2)	ED117325 ED130058
*OCCUPATIONAL GUIDANCE	(1)	ED058456
OCCUPATIONAL GUIDANCE	(7)	ED058455 ED063465 ED130116 ED136061 ED141499 ED141500 ED141501
*OCCUPATIONAL INFORMATION	(1)	ED117567
OCCUPATIONAL INFORMATION	(9)	ED089036 ED089037 ED089041 ED089043 ED106606 ED107824 ED117565 ED117566 ED120348
OCCUPATIONS	(1)	ED107897
*OCEAN ENGINEERING	(1)	ED164352
OCEAN ENGINEERING	(2)	ED164353 ED177014
*OCEANIC EDUCATION ACTIV FOR GREAT LAKES SCHOOLS	(7)	ED179352 ED179353 ED179354 ED179355 ED179356 ED179357 ED179358
*OCEANOGRAPHY	(21)	ED177013 ED177015 ED178307 ED178332 ED178344 ED179352 ED179353 ED179354 ED179355 ED179356 ED179357 ED179358 ED184875 ED187517# ED193020 ED193052 ED194302 ED194325 ED198010 ED198011 ED198014
OCEANOGRAPHY	(6)	ED177012 ED177014 ED178296 ED178297 ED194306 ED198013
*OCEANOLOGY	(43)	ED028097 ED042622 ED046715 ED046735 ED061060 ED086552 ED086554 ED086555 ED086556 ED086557 ED106088 ED106089# ED128207 ED137063 ED138462 ED141083 ED141084 ED141085 ED141086 ED141142 ED141145 ED141148 ED141149 ED141150 ED141151 ED141152 ED141153 ED141154 ED141155 ED141156 ED141158 ED141160 ED141161 ED141175 ED164347 ED164349 ED164350 ED164351 ED164352 ED164353 ED164354 ED167421 ED174442
OCEANOLOGY	(6)	ED086553 ED094956 ED107523 ED107897 ED125934 ED141164
*ODORS	(1)	ED107513
*OHIO	(2)	ED127160 ED127161
OHIO SEA GRANT	(7)	ED179352 ED179353 ED179354 ED179355 ED179356 ED179357 ED179358
*OPEN EDUCATION	(1)	ED084016
*OPTICS	(4)	ED071900 ED071901 ED093622 ED124384
OPTICS	(1)	ED064096
ORANGE COUNTY CONSORTIUM	(1)	ED114523
OREGON	(1)	ED022690
OREGON (PORTLAND)	(2)	ED110768 ED110769
*OREGON STATE DEPARTMENT OF EDUCATION	(1)	ED173181

ORGANIC CHEMISTRY	(2)	ED064097 ED161752
ORGANIZATIONS (GROUPS)	(1)	ED107777
*ORNAMENTAL HORTICULTURE OCCUPATION	(1)	ED013295
*OUTCOMES OF EDUCATION	(1)	ED193069
*OUTDOOR ACTIVITIES	(3)	ED190400 ED196661 ED196662
*OUTDOOR EDUCATION	(28)	ED034676 ED042634 ED042635 ED042645 ED068310 ED068367 ED068368 ED070588 ED073929 ED073930 ED082927 ED089899 ED094912 ED097210 ED099149 ED106074 ED108374 ED134408 ED175730 ED180811 ED180812 ED180813 ED18081[illegible] ED183374 ED194302 ED194325 ED195389 ED196731
OUTDOOR EDUCATION	(46)	ED042636 ED042638 ED042643 ED045380 ED068366 ED075217 ED075219 ED075221 ED089366 ED100637 ED100652 ED100653 ED100654 ED100655 ED100656 ED100657 ED100658 ED100662 ED100663 ED100667 ED100697 ED100698 ED101937 ED101939 ED101942 ED103241 ED103243 ED103244 ED103245 ED103249 ED103250 ED103251 ED103253 ED104645 ED106088 ED106089* ED108375 ED108890 ED123055 ED128245 ED183363 ED183368 ED184875 ED193050 ED193052 ED198012
*OUT OF SCHOOL YOUTH	(1)	ED119942*
*PALEONTOLOGY	(1)	ED178341
PALEONTOLOGY	(1)	ED178340
PAMPHLETS	(12)	ED054939 ED077776 ED178338 ED178339 ED178340 ED178341 ED178342 ED178343 ED178344 ED178345 ED178346 ED178347
*PARASITOLOGY	(1)	ED130901
*PARENT RESOURCES	(1)	ED135192
*PARENT ROLE	(1)	ED135192
PARENT ROLE	(1)	ED139522
PATTERN RECOGNITION	(2)	ED127171 ED127176
PCE	(2)	ED110768 ED110769
PEAUCELLIER'S MECHANISM	(1)	ED096549
PENNSYLVANIA	(4)	ED094956 ED141499 ED141500 ED141501
*PERCEPTION	(1)	ED127172
PERCEPTION	(2)	ED064131 ED180134
PERCEPTUAL DEVELOPMENT	(1)	ED089483
PERCEPTUAL MOTOR LEARNING	(6)	ED128080 ED128081 ED128082 ED128083 ED128084 ED128085
PERFORMANCE BASED EDUCATION	(1)	ED130116
*PERFORMANCE BASED TEACHER EDUCATION	(1)	ED104860
*PERFORMANCE CRITERIA	(1)	ED104860
PERFORMANCE CRITERIA	(4)	ED036428 ED074202 ED089979 ED179402
PERFORMANCE FACTORS	(1)	ED074202

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*PERFORMANCE SPECIFICATIONS	(2)	ED089036 ED089041
PERFORMANCE SPECIFICATIONS	(2)	ED074202 ED089037
PERFORMANCE TESTS	(1)	ED178267
PERSONAL ADJUSTMENT	(3)	ED101012* ED109849 ED109850
PERSONAL GROWTH	(5)	ED087912 ED087913 ED087914 ED087915 ED087916
PERSONALITY TESTS	(1)	ED101012*
*PESTICIDES	(1)	ED141158
PETROLEUM INDUSTRY	(3)	ED179395 ED186281 ED187554
PHILADELPHIA	(1)	ED064068
PHILOSOPHY	(1)	ED138442
PHOTOGRAPHIC EQUIPMENT	(2)	ED171570 ED193074
*PHOTOGRAPHY	(3)	ED124376 ED171570 ED193074
PHOTOGRAPHY	(2)	ED107897 ED188568
PHOTOSYNTHESIS	(1)	ED070912
*PHYSICAL ACTIVITIES	(1)	ED080476
PHYSICAL DEVELOPMENT	(2)	ED109849 ED109850
*PHYSICAL EDUCATION	(1)	ED095695
PHYSICAL EDUCATION	(6)	ED075976 ED088244 ED091902 ED118963 ED134742 ED136061
PHYSICAL ENVIRONMENT	(1)	ED125934
*PHYSICAL GEOGRAPHY	(1)	ED128245
PHYSICAL GEOGRAPHY	(2)	ED125934 ED128244
PHYSICAL HEALTH	(1)	ED100057
*PHYSICAL SCIENCES	(37)	ED021746 ED052002 ED052003 ED053981 ED076671 ED075441 ED086476 ED086477 ED086478 ED086519 ED093622 ED096119 ED098060 ED100697 ED111610 ED111611 ED111613 ED111614 ED111615 ED111616 ED111621 ED111622 ED111629 ED111638 ED111639 ED127194 ED128207 ED141160 ED168306 ED174475 ED184817 ED194353 ED196658 ED196668 ED196669 ED196670 ED196671
PHYSICAL SCIENCES	(39)	ED032236 ED040067 ED064043 ED064044 ED071888 ED071890 ED071891 ED079025 ED079054 ED079055 ED079056 ED089979 ED091174 ED091175 ED091222 ED093656 ED096113 ED096141 ED099188 ED108940 ED111631 ED111632 ED123059 ED128244 ED128245 ED129610 ED129611 ED134422 ED134424 ED134425 ED134426 ED141149 ED141164 ED141175 ED167410 ED188370 ED191675 ED191690 ED193669
*PHYSICS	(57)	ED071882 ED071883 ED071884 ED071885 ED071886 ED071887 ED071888 ED071889 ED071890 ED071891 ED071892 ED071893 ED071894 ED071895 ED071896 ED071897 ED071899 ED071900 ED071901 ED071902 ED071903 ED071905 ED071906 ED071912 ED071913 ED071914 ED071915 ED071916 ED079026 ED079028 ED089043 ED093658 ED093659 ED093692 ED095017 ED096122 ED096152 ED097195 ED109698 ED111638 ED111639 ED117566 ED124373 ED124374 ED124376 ED124379 ED124380 ED124381 ED127161 ED129605 ED173162 ED174475 ED182145 ED182146 ED190376 ED190377 ED190378

PHYSICS	(40)	ED022691 ED024592 ED042645 ED070909 ED071398 ED071904 ED071907 ED071908 ED071909 ED071910 ED071911 ED079027 ED081193 ED088519 ED089740 ED091164 ED091176 ED095029 ED096113 ED107518 ED107519 ED107520 ED107521 ED107522 ED107523 ED107524 ED121613 ED124370 ED124384 ED124393 ED162236 ED168806 ED178343 ED178344 ED178345 ED179395 ED193063 ED194347# ED197924 ED198011
*PHYSICS CURRICULUM	(5)	ED063465 ED131291 ED131292 ED131293 ED131294
*PHYSICS EXPERIMENTS	(2)	ED071904 ED071909
PHYSICS EXPERIMENTS	(1)	ED162851
*PHYSICS INSTRUCTION	(3)	ED052608 ED131293 ED131294
PHYSICS INSTRUCTION	(2)	ED131291 ED131292
*PHYSIOLOGY	(5)	ED062177 ED090033 ED103238 ED111631 ED111632
PHYSIOLOGY	(1)	ED045381
PILOBOLUS	(1)	ED100684
*PLANETARIUMS	(1)	ED188947
PLANETARIUMS	(1)	ED046215
*PLANT GROWTH	(2)	ED103243 ED196659
PLANT GROWTH	(3)	ED070912 ED091233 ED097213
*PLANT IDENTIFICATION	(3)	ED099140 ED103245 ED193050
PLANT IDENTIFICATION	(1)	ED097213
*PLANTS	(3)	ED103243 ED103245 ED103246
PLANTS	(1)	ED103244
PLANTS (BOTANY)	(1)	ED196731
*PLANT SCIENCE	(2)	ED091233 ED103246
PLANT SCIENCE	(2)	ED097213 ED141175
*POLICY FORMATION	(1)	ED166014
*POLLUTION	(5)	ED047939 ED079141 ED096139 ED097217 ED175723
POLLUTION	(13)	ED045380 ED091216 ED094912 ED096137 ED096098 ED107517 ED107524 ED141158 ED175730 ED178344 ED179375 ED180813 ED183374
*POPULATION EDUCATION	(1)	ED097215
POPULATION EDUCATION	(1)	ED103239
*POPULATION GROWTH	(3)	ED096142 ED096143 ED096144
POPULATION GROWTH	(1)	ED183368
*POPULATION TRENDS	(1)	ED141145
POPULATION TRENDS	(2)	ED096143 ED096144

PORTLAND	(1)	ED022690
*PORTLAND PROJECT	(6)	ED064095 ED134422 ED134423 ED134424 ED134425 ED134426
PORTLAND PROJECT	(3)	ED022690 ED064096 ED064097
POSTAGE STAMPS	(1)	ED129605
POST SECONDARY EDUCATION	(17)	ED099496 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512
POST TESTING	(2)	ED114466 ED114677
*POWER PLANTS	(1)	ED107522
POWER PLANTS	(2)	ED107517 ED107518
*PRESCHOOL CHILDREN	(1)	ED024458
PRESCHOOL CHILDREN	(1)	ED084016
PRESCHOOL CURRICULUM	(1)	ED024458
*PRESCHOOL EDUCATION	(1)	ED136539
PRESCHOOL EDUCATION	(2)	ED111664 ED140601
PRESCHOOL PROGRAMS	(1)	ED024458
PRESERVICE EDUCATION	(1)	ED086230#
PRETESTING	(1)	ED114677
PRETESTS	(1)	ED114466
*PREVOCATIONAL EDUCATION	(1)	ED091902
*PRIMARY EDUCATION	(2)	ED110768 ED114466
PRIMARY EDUCATION	(10)	ED097210 ED098067 ED103241 ED103243 ED103246 ED103252 ED134461 ED141531 ED167421 ED194847#
*PRIMARY GRADES	(5)	ED060587 ED066505 ED071772 ED079047 ED123055
PRIMARY GRADES	(31)	ED098073 ED100637 ED127164 ED127169 ED127170 ED127171 ED127172 ED127173 ED127174 ED127175 ED127176 ED127177 ED127178 ED127179 ED127180 ED127181 ED127183 ED127184 ED127185 ED127186 ED127187 ED127188 ED127189 ED127190 ED127191 ED127192 ED127193 ED127194 ED127195 ED127196 ED127197
PRINCIPALS	(1)	ED180134
PROBLEMS	(1)	ED068325
PROBLEM SETS	(1)	ED071883
*PROBLEM SOLVING	(6)	ED0[illegible]1193 ED190372 ED190373 ED190374 ED190375 ED196702
PROBLEM SOLVING	(15)	ED071264 ED071265 ED071266 ED071267 ED083045 ED086230# ED087189 ED100777 ED120348 ED126891 ED140601 ED173086 ED180778 ED182181 ED183947
*PROCESS EDUCATION	(4)	ED103235 ED116995 ED127187 ED180772
PROCESS EDUCATION	(34)	ED127164 ED127165 ED127169 ED127170 ED127171 ED127172 ED127173

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ED179402 ED180811 ED180838

PRODUCTION TECHNIQUES (1) ED107517

*PROGRAM CONTENT (2) ED099188 ED099189

*PROGRAM DESCRIPTIONS (7) ED086837 ED089984 ED108940 ED108943 ED109850 ED184873 ED184874

PROGRAM DESCRIPTIONS (10) ED022690 ED022691 ED052607 ED052608 ED089740 ED099188 ED111617
ED111618 ED119942* ED188937

PROGRAM DESIGN (1) ED074202

*PROGRAM DEVELOPMENT (1) ED136061

PROGRAM DEVELOPMENT (1) ED074202

*PROGRAMED INSTRUCTION (23) ED025429 ED071912 ED071913 ED071914 ED071915 ED071916 ED099497
ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505
ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512 ED196702

PROGRAMED INSTRUCTION (1) ED099496

*PROGRAMED MATERIALS (17) ED099496 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502
ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510
ED099511 ED099512

PROGRAMED MATERIALS (1) ED096549

*PROGRAMED TEXTS (2) ED045341 ED096549

*PROGRAM EVALUATION (3) ED074202 ED086837 ED180801

PROGRAM EVALUATION (3) ED066505 ED066506 ED066507

*PROGRAM GUIDES (7) ED118418 ED124370 ED124376 ED124379 ED124381 ED124384 ED124393

PROGRAM GUIDES (4) ED074202 ED124373 ED124374 ED124380

*PROGRAM IMPLEMENTATION (1) ED188937

*PROGRAMING (1) ED081193

PROGRAMING (2) ED184873 ED184874

*PROGRAM PLANNING (1) ED104645

PROGRAM PLANNING (4) ED074202 ED079831 ED108874 ED128245

*PROGRAM PROPOSALS (1) ED074202

*PROJECT CAREER EDUCATION (2) ED110768 ED110769

PROJECT COAST (16) ED141142 ED141145 ED141148 ED141149 ED141150 ED141151 ED141152
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ED141164

*PROJECT HEAD START (1) ED024458

*PROJECT I C E (12) ED100652 ED100653 ED100654 ED100655 ED100656 ED100657 ED100658
ED100662 ED100663 ED100667 ED100697 ED100698

PROJECT LEARNING EXPERIENCES IN TECHNOLOGY	(1)	ED112187
PROJECT LET	(1)	ED112187
PROJECT SOUL	(2)	ED184873 ED184874
PROJECT TRAINING METHODS	(1)	ED063465
*PSYCHOLOGICAL STUDIES	(1)	ED080476
*PSYCHOLOGICAL TESTS	(1)	ED101012*
PSYCHOLOGY	(1)	ED182107
PSYCHOMETRICS	(1)	ED059900
PSYCHOMOTOR OBJECTIVES	(3)	ED036428 ED089979 ED186247
PSYCHOMOTOR SKILLS	(1)	ED093687
PUBLICATIONS	(1)	ED107777
PUBLIC POLICY	(4)	ED183368 ED187555 ED191743 ED191745
QUADRATIC EQUATIONS	(2)	ED188940 ED188941
QUANTUM MECHANICS	(3)	ED071902 ED071903 ED071905
*QUESTIONING TECHNIQUES	(1)	ED120018
QUESTIONING TECHNIQUES	(1)	ED098098
QUESTIONNAIRES	(1)	ED120018
*QUINMESTER PROGRAM	(43)	ED062179 ED070597 ED079024 ED079025 ED079026 ED079027 ED079028 ED079029 ED079030 ED079031 ED079133 ED079134 ED079135 ED079137 ED079138 ED079139 ED079140 ED079141 ED084031 ED086519 ED086520 ED086521 ED086522 ED086523 ED086524 ED086526 ED086528 ED090029 ED090030 ED090031 ED090032 ED090033 ED091176 ED091177 ED092356 ED092357 ED092358 ED093622 ED093655 ED093656 ED093657 ED093658 ED093659
QUINMESTER PROGRAM	(1)	ED062177
*RACHEL CARSON PROJECT	(2)	ED099188 ED099189
*RACIAL ATTITUDE AND CULTURAL EXPRESSION TEST	(1)	ED101013
*RACIAL ATTITUDES	(1)	ED101013
*RADFORD CAREER EDUCATION PROGRAM	(1)	ED107897
*RADIATION	(6)	ED071907 ED071908 ED071910 ED071911 ED182145 ED182146
RADIATION	(7)	ED071897 ED091216 ED107517 ED107518 ED107522 ED107524 ED107897
*RADIATION BIOLOGY	(1)	ED194321
RADIATION EFFECTS	(3)	ED071910 ED182145 ED182146
RADIOACTIVITY	(1)	ED107524
*RADIOISOTOPES	(1)	ED107524

RADIOISOTOPES (6) ED071908 ED071910 ED107517 ED107518 ED107520 ED121613
RADIOLOGY (2) ED182145 ED182146

*RATING SCALES (1) ED162250

READING (6) ED094514 ED100078 ED135192 ED140569 ED182107 ED190401

*READING ATTITUDES (1) ED162250

READING COMPREHENSION (1) ED116181

*READING IMPROVEMENT (1) ED116181

*READING INSTRUCTION (2) ED116181 ED123564

READING INSTRUCTION (1) ED100057

READING INTERESTS (1) ED162250

*READING MATERIALS (1) ED173165

READING MATERIALS (4) ED071902 ED071907 ED111663 ED196735

*READING SKILLS (2) ED123564 ED175715

RECORDS (FORMS) (13) ED190358 ED190362 ED190363 ED190366 ED190367 ED190370 ED190371
ED190374 ED190375 ED190377 ED190378 ED190381 ED190382

RECREATION (2) ED093596 ED108874

*REFERENCE MATERIALS (1) ED198014

REFERENCE MATERIALS (3) ED044302 ED170141 ED173165

REGULAR CLASS PLACEMENT (1) ED136530

RELATIVITY (4) ED071902 ED071903 ED071905 ED128244

REMEDIAL INSTRUCTION (1) ED070671

*REMOTE SENSING (1) ED170141

*REPRODUCTION (BIOLOGY) (2) ED095024 ED095025

REPRODUCTION (BIOLOGY) (2) ED062179 ED134423

*RESEARCH (1) ED080476

RESEARCH (2) ED111617 ED111618

*RESEARCH REPORTS (2) ED094958 ED162894

RESEARCH REPORTS (1) ED089984

*RESEARCH REVIEWS (PUBLICATIONS) (1) ED059900

RESOURCE CENTERS (1) ED104645

*RESOURCE GUIDES (5) ED117565 ED117566 ED117567 ED170141 ED171570

RESOURCE GUIDES (23) ED086500 ED089993 ED091902 ED094514 ED100079 ED102328 ED107777
ED111663 ED114466 ED114467 ED128080 ED128081 ED128082 ED128083 ED128084
ED128085 ED132044 ED136509 ED141499 ED141500 ED141501 ED141531 ED141532

*RESOURCE MATERIALS	(23)	ED058455 ED077737 ED077738 ED086490 ED092389 ED092390 ED092391 ED095294 ED111623 ED111624 ED111629 ED182107 ED182135 ED188929 ED188930 ED188931 ED188932 ED188933 ED188934 ED193061 ED193062 ED193063 ED196721
RESOURCE MATERIALS	(45)	ED045411 ED046715 ED059866 ED063464 ED079024 ED079025 ED079026 ED079027 ED079028 ED079029 ED079030 ED079031 ED079133 ED079134 ED079135 ED079137 ED079138 ED079141 ED083044 ED086555 ED089036 ED089037 ED089041 ED094912 ED098098 ED100709 ED100710 ED106606 ED107519 ED107824 ED107897 ED111619 ED111620 ED111627 ED111628 ED111630 ED136061 ED137538 ED141500 ED141501 ED141531 ED141532 ED173181 ED188862 ED194347#
*RESOURCE UNITS	(1)	ED106606
RESOURCE UNITS	(4)	ED064068 ED082978 ED193048 ED193050
*RHODE ISLAND	(2)	ED137063 ED138462
RIVERS	(1)	ED141161
*ROCKETRY	(1)	ED058455
*RURAL DEVELOPMENT	(1)	ED119942#
*SAFETY	(6)	ED034697 ED091173 ED107518 ED138463 ED174473 ED193080
SAFETY	(4)	ED107523 ED174472 ED174474 ED174475
*SAFETY EDUCATION	(2)	ED091173 ED174475
SAFETY EDUCATION	(3)	ED075976 ED109849 ED109850
SAFETY EQUIPMENT	(2)	ED174473 ED174474
*SALINITY	(1)	ED141161
SALINITY	(1)	ED128207
*SAMPLING	(3)	ED044302 ED103247 ED103252
SAPA	(2)	ED103235 ED123055
*SCHOOL DISTRICTS	(1)	ED079881
SCHOOL DISTRICTS	(1)	ED193069
*SCHOOL PERSONNEL	(1)	ED188937
*SCHOOL SAFETY	(3)	ED174472 ED174473 ED174474
SCHOOL SAFETY	(2)	ED174475 ED193080
*SCHOOL YARDS	(1)	ED196731
*SCIENCE ACTIVITIES	(128)	ED021745 ED022691 ED024458 ED032236 ED040086 ED040087 ED040088 ED045411 ED046715 ED052567 ED053981 ED053982 ED059866 ED064042 ED064043 ED064044 ED070588 ED070571 ED071772 ED071889 ED071899 ED071904 ED071909 ED082927 ED083044 ED091157 ED091175 ED091216 ED093599 ED093619 ED097195 ED109684 ED100709 ED100710 ED103233 ED106104 ED111661 ED113171 ED115032 ED118418 ED118430 ED123055 ED124370 ED124373 ED124374 ED124376 ED124379 ED124380 ED124381 ED124384 ED124393 ED132044 ED134422 ED134423 ED134424 ED134425 ED134426 ED134461 ED134462 ED141150 ED141151 ED159022 ED161727 ED162895 ED167409 ED167421 ED171570 ED173181 ED178338 ED178339 ED178340 ED178341 ED178342 ED178343 ED178344 ED178345 ED178346 ED178347 ED179352 ED179353 ED179354 ED179355 ED179356 ED179357 ED180772 ED180811 ED180812

ED182135 ED188862 ED188870 ED190356 ED190357 ED190358 ED190360 ED190361
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ED190372 ED190373 ED190375 ED190376 ED190377 ED190378 ED194306 ED194321
ED195391 ED196656 ED196657 ED196658 ED196659 ED196660 ED196662 ED196667
ED196668 ED196669 ED196670 ED196673 ED196674 ED196675 ED196676 ED196731
ED197984

SCIENCE ACTIVITIES (80) ED021746 ED022690 ED025429 ED028097 ED034676 ED040047 ED040089
ED042636 ED042643 ED042645 ED046168 ED047939 ED052000 ED052001 ED052002
ED052003 ED052004 ED052005 ED053945 ED064068 ED064095 ED065293 ED068277
ED070675 ED071884 ED071890 ED071891 ED071894 ED071901 ED071906 ED071911
ED077655 ED077737 ED077738 ED079141 ED080032 ED080033 ED080859 ED080871
ED089372 ED089373 ED089374 ED089375 ED089376 ED089377 ED089378 ED093282*
ED089483 ED091153 ED091154 ED091164 ED091174 ED091215 ED091217 ED094956
ED101942 ED116995 ED120348 ED136530 ED167424 ED179358 ED180773 ED180809
ED180810 ED180813 ED180814 ED184875 ED188947 ED190359 ED190370 ED190371
ED190374 ED190379 ED190380 ED190381 ED190382 ED191660 ED196661 ED196671
ED196702

SCIENCE A PROCESS APPROACH (2) ED103235 ED123055

*SCIENCE CAREERS (3) ED107769 ED107777 ED162894

SCIENCE CAREERS (11) ED107824 ED120348 ED124370 ED124373 ED124374 ED124376 ED124379
ED124380 ED124381 ED124384 ED124393

*SCIENCE COURSE IMPROVEMENT PROJECT (3) ED065289 ED089931 ED167410

SCIENCE COURSE IMPROVEMENT PROJECT (10) ED022690 ED022691 ED113176 ED119993 ED134422 ED134423 ED134424
ED134425 ED134426 ED167409

*SCIENCE COURSE IMPROVEMENT PROJECTS (16) ED178267 ED178336 ED178338 ED178339 ED178340 ED178341 ED178342
ED178343 ED178344 ED178345 ED178346 ED178347 ED179352 ED179353 ED179354
ED179355

SCIENCE COURSE IMPROVEMENT PROJECTS (63) ED179356 ED179357 ED179358 ED188862 ED188929 ED188930 ED188931
ED188932 ED188933 ED188934 ED188937 ED188938 ED188939 ED188940 ED188941
ED188942 ED188943 ED188944 ED188945 ED188946 ED190357 ED190358 ED190359
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ED194321 ED195391 ED196656 ED196657 ED196658 ED196659 ED196660 ED196661
ED196662 ED196668 ED196670 ED196673 ED196674 ED196675 ED196676 ED197984

*SCIENCE COURSES (2) ED129610 ED129611

SCIENCE COURSES (1) ED116181

*SCIENCE CURRICULUM (44) ED038726 ED054118 ED068465 ED070766 ED072042 ED091222 ED093699
ED106105 ED107824 ED107597 ED108943 ED120348 ED134461 ED134462 ED173158
ED173159 ED173161 ED173162 ED174442 ED176993 ED179419 ED180778 ED182172
ED186239 ED186282 ED187578 ED188929 ED188930 ED188931 ED188932 ED188933
ED188934 ED191663 ED191675 ED191676 ED191680 ED191692 ED196658 ED196660
ED196661 ED196671 ED196674 ED196675 ED196699

SCIENCE CURRICULUM (45) ED054939 ED087628 ED093641 ED093700 ED106606 ED107769 ED117565
ED117566 ED117567 ED129610 ED129611 ED141531 ED141532 ED173160 ED173181
ED178267 ED179351 ED179352 ED179353 ED179354 ED179355 ED179356 ED179357
ED179358 ED180838 ED182133 ED182145 ED182146 ED188937 ED188942 ED188943
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ED196657 ED196659 ED196662 ED196669 ED196670 ED196676

*SCIENCE EDUCATION (135) ED011507 ED024458 ED028101 ED046215 ED059900 ED065289 ED068465
ED070766 ED077655 ED079054 ED079655 ED079656 ED083045 ED091173 ED096135

ED096136 ED098098 ED100637 ED100662 ED100663 ED100667 ED100684 ED100697
ED100698 ED101937 ED101939 ED101942 ED103233 ED103234 ED103235 ED103236
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ED186231 ED186247 ED186281 ED186282 ED187517# ED187554 ED187555 ED187557
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ED194353 ED196667 ED196721 ED197984 ED198010 ED198011 ED198012 ED198014

SCIENCE EDUCATION (348) ED065362 ED070097 ED071772 ED071912 ED071913 ED071914 ED071915
ED071916 ED077776 ED079135 ED079139 ED079140 ED079141 ED080352 ED080353
ED080359 ED080371 ED080372 ED080373 ED080374 ED080375 ED080376 ED080377
ED080378 ED083044 ED084081 ED085232# ED086230# ED086476 ED086477 ED086478
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ED106105 ED107200 ED107519 ED107764 ED107777 ED108940 ED108943 ED111621
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ED194347# ED195391 ED196656 ED196657 ED196658 ED196659 ED196660 ED196662
ED196668 ED196669 ED196670 ED196671 ED196673 ED196674 ED196675 ED196676
ED196699 ED196702 ED196731 ED196735 ED198013

*SCIENCE EDUCATION RESEARCH (1) ED196721

*SCIENCE EQUIPMENT (4) ED091154 ED188862 ED188870 ED188925

SCIENCE EQUIPMENT	(3)	ED028097	ED136444	ED194302				
*SCIENCE EXPERIMENTS	(10)	ED071894	ED071899	ED080359	ED091153	ED091154	ED091217	ED162851
	ED182145	ED182146	ED190400					
SCIENCE EXPERIMENTS	(8)	ED071889	ED071909	ED107824	ED132044	ED173159	ED173161	ED173162
	ED188862							
*SCIENCE FACILITIES	(1)	ED136444						
SCIENCE FICTION	(1)	ED071887						
*SCIENCE HISTORY	(4)	ED065362	ED111630	ED129605	ED188862			
SCIENCE HISTORY	(5)	ED086526	ED196668	ED196669	ED196670	ED196671		
*SCIENCE INSTRUCTION	(13)	ED093699	ED104860	ED116181	ED173158	ED174473	ED174474	ED179351
	ED180838	ED187517*	ED191680	ED191692	ED193050	ED194353		
SCIENCE INSTRUCTION	(43)	ED093694	ED107200	ED107764	ED134742	ED174472	ED176993	ED178338
	ED178339	ED178340	ED178341	ED178342	ED178343	ED178344	ED178345	ED178346
	ED178347	ED179352	ED179353	ED179354	ED179355	ED179356	ED179357	ED179358
	ED180772	ED182138	ED191660	ED191675	ED191676	ED191694*	ED193048	ED193052
	ED193063	ED194347*	ED196659	ED196662	ED196667	ED196699	ED196731	ED196735
	ED197984	ED198010	ED198011	ED198012				
*SCIENCE MATERIALS	(10)	ED071897	ED091157	ED091216	ED106104	ED107764	ED113176	ED124384
	ED124393	ED191660	ED196676					
SCIENCE MATERIALS	(28)	ED024458	ED038726	ED071772	ED071887	ED071892	ED071902	ED071907
	ED091153	ED091154	ED091164	ED091215	ED113171	ED124370	ED124373	ED124374
	ED124376	ED124379	ED124380	ED124381	ED130901	ED130903	ED138463	ED139522
	ED173072	ED178267	ED178306	ED178307	ED198014			
*SCIENCE PROGRAMS	(8)	ED024458	ED119993	ED138442	ED193069	ED196668	ED196669	ED196670
	ED196671							
SCIENCE PROGRAMS	(6)	ED038726	ED108943	ED136444	ED173158	ED188947	ED196673	
*SCIENCE PROJECTS	(1)	ED132044						
*SCIENCES	(11)	ED046168	ED066505	ED066506	ED066507	ED095695	ED112632	ED115032
	ED133161	ED141163	ED178306	ED178307				
SCIENCES	(32)	ED060587	ED060588	ED063162	ED075976	ED082978	ED087183	ED087189
	ED087912	ED087913	ED087914	ED087915	ED087916	ED098673	ED100078	ED101959
	ED108874	ED108875	ED109849	ED109850	ED110769	ED116181	ED118963	ED123564
	ED135192	ED140569	ED140601	ED142488	ED142489	ED162894	ED182135	ED183368
	ED195389							
*SCIENCE TEACHERS	(2)	ED034697	ED072042					
SCIENCE TESTS	(1)	ED178267						
*SCIENCE UNITS	(19)	ED052067	ED064068	ED080332	ED080333	ED080371	ED080372	ED080373
	ED080374	ED080375	ED080376	ED080377	ED080378	ED085232*	ED093709	ED094912
	ED096417	ED107769	ED107777	ED116995				
SCIENCE UNITS	(18)	ED102328	ED107834	ED111661	ED114466	ED114467	ED114677	ED128981
	ED128083	ED129677	ED134422	ED134423	ED134424	ED134425	ED134426	ED136061
	ED136509	ED137538	ED167424					
SCIENTIFIC ATTITUDES	(1)	ED028101						

*SCIENTIFIC CONCEPTS	(5)	ED032236 ED071890 ED071905 ED071910 ED191663
SCIENTIFIC CONCEPTS	(11)	ED071895 ED071900 ED093687 ED093700 ED134461 ED134462 ED167410 ED173072 ED176993 ED179419 ED193048
SCIENTIFIC ENTERPRISE	(2)	ED028101 ED180778
*SCIENTIFIC LITERACY	(3)	ED011000 ED025436 ED178332
SCIENTIFIC LITERACY	(3)	ED028101 ED176993 ED186247
*SCIENTIFIC METHODOLOGY	(3)	ED011009 ED124331 ED174475
SCIENTIFIC METHODOLOGY	(2)	ED038726 ED176993
SCIENTIFIC PRINCIPLES	(1)	ED053981
*SCIENTIFIC RESEARCH	(5)	ED107520 ED107521 ED107523 ED133199 ED133200
SCIENTIFIC RESEARCH	(5)	ED107517 ED107518 ED107522 ED107524 ED133198
*SCIENTISTS	(1)	ED129605
SCORING	(1)	ED162250
SEA GRANT	(1)	ED162915
*SEA GRANT PROGRAM	(6)	ED177012 ED177013 ED177014 ED177015 ED178296 ED178297
SEAMEN	(1)	ED164352
SEASONS	(1)	ED101939
*SEA WORLD INC	(4)	ED141083 ED141084 ED141085 ED141086
*SECONDARY EDUCATION	(42)	ED042640 ED100661 ED100662 ED100663 ED100667 ED106083 ED106089# ED107513 ED107897 ED109349 ED114677 ED128059 ED128207 ED141150 ED168896 ED170141 ED173159 ED173160 ED173163 ED173165 ED174474 ED175710 ED175712 ED175716 ED175718 ED175719 ED175730 ED177014 ED179375 ED179395 ED182135 ED182172 ED184873 ED184874 ED187517# ED188937 ED188938 ED188939 ED188941 ED188946 ED193048 ED196702
SECONDARY EDUCATION	(184)	ED046215 ED098898 ED099188 ED100073 ED100079 ED100777 ED106104 ED106105 ED108890 ED111610 ED111611 ED111613 ED111614 ED111615 ED111616 ED111617 ED111618 ED111619 ED111620 ED111621 ED111622 ED111623 ED111624 ED111625 ED111626 ED111627 ED111628 ED111629 ED111630 ED111631 ED111632 ED111638 ED111639 ED111662 ED111663 ED111664 ED112632 ED113171 ED113176 ED116181 ED117325 ED117565 ED117566 ED117567 ED118430 ED118782 ED120348 ED121613 ED124370 ED124373 ED124374 ED124376 ED124379 ED124380 ED124381 ED124384 ED124393 ED126934 ED127161 ED129610 ED129611 ED130116 ED130901 ED130903 ED131291 ED131292 ED131293 ED131294 ED133197 ED133198 ED133199 ED133200 ED134422 ED134423 ED134424 ED134425 ED134426 ED134742 ED137075 ED137538 ED140569 ED141151 ED141152 ED141153 ED141155 ED141164 ED141175 ED141532 ED161752 ED171570 ED173158 ED173161 ED173162 ED173164 ED174473 ED175711 ED175717 ED175723 ED177012 ED178306 ED178307 ED178338 ED178339 ED178340 ED178341 ED178342 ED178343 ED178344 ED178345 ED178346 ED178347 ED179356 ED179357 ED179358 ED179374 ED179419 ED180778 ED180791 ED180809 ED180810 ED180812 ED180813 ED180814 ED180827 ED182145 ED182146 ED183363 ED183392 ED184817 ED186239 ED186247 ED186282 ED188862 ED188870 ED188925 ED188940 ED188942 ED188943 ED188944 ED188945 ED190356 ED190357 ED190358 ED190359 ED190360 ED190361 ED190362 ED190363 ED190364 ED190365 ED190366 ED190367 ED190368 ED190369 ED190370 ED190371 ED190372 ED190373 ED190374 ED190375 ED190376 ED190377 ED190378 ED190379 ED190380 ED190381 ED190382 ED190400 ED191660 ED191676 ED191692 ED191694# ED191745 ED193052 ED193063

	ED194321	ED194325	ED194353	ED196656	ED196667	ED196699	ED196731	ED198011
	ED198012							
*SECONDARY GRADES	(16)	ED063162	ED067299	ED070672	ED070673	ED070674	ED077776	ED079099
	ED082978	ED086230#	ED089036	ED089041	ED089043	ED096417	ED101959	ED141148
	ED141163							
SECONDARY GRADES	(56)	ED064131	ED068325	ED070671	ED070675	ED070907	ED070909	ED070912
	ED070916	ED071883	ED071884	ED071885	ED071886	ED071887	ED071888	ED071889
	ED071890	ED071891	ED071892	ED071893	ED071894	ED071895	ED071896	ED071897
	ED071898	ED071899	ED071900	ED071901	ED071902	ED071903	ED071904	ED071905
	ED071906	ED071907	ED071908	ED071909	ED071910	ED071911	ED080361	ED080366
	ED081193	ED089740	ED103234	ED103236	ED103238	ED103239	ED103244	ED103247
	ED103250	ED103251	ED103253	ED141149	ED141154	ED141156	ED141158	ED141160
	ED141161							
*SECONDARY SCHOOL MATHEMATICS	(2)	ED083045	ED198061					
SECONDARY SCHOOL MATHEMATICS	(6)	ED052608	ED086230#	ED141499	ED141501	ED184873	ED184874	
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	ED045380	ED045411	ED046715	ED052000	ED052001	ED052002	ED052003	ED052004
	ED052005	ED053982	ED059356	ED061060	ED064095	ED064096	ED064097	ED065362
	ED070597	ED070671	ED070675	ED071882	ED071885	ED071886	ED071887	ED071888
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	ED071899	ED071900	ED071901	ED071902	ED071903	ED071904	ED071905	ED071906
	ED071907	ED071908	ED071909	ED071910	ED071911	ED071912	ED071913	ED071914
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	ED079138	ED079140	ED079141	ED080332	ED080333	ED080371	ED080372	ED080373
	ED080374	ED080375	ED080376	ED080377	ED080378	ED081610	ED081611	ED084061
	ED085232#	ED086520	ED086521	ED086522	ED086526	ED086528	ED086552	ED086553
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	ED090031	ED090032	ED090033	ED091175	ED091176	ED091177	ED091215	ED091233
	ED092356	ED092357	ED092358	ED093599	ED093622	ED093655	ED093656	ED093657
	ED093658	ED093659	ED093686	ED093690	ED093700	ED094956	ED095017	ED095024
	ED095025	ED095027	ED095028	ED095029	ED096113	ED096115	ED096117	ED096119
	ED096120	ED096122	ED096123	ED096124	ED096125	ED096126	ED096127	ED096130
	ED096137	ED096139	ED096140	ED096143	ED096144	ED096146	ED096147	ED096148
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	ED100698	ED100709	ED100710	ED101942	ED106105	ED108943	ED111662	ED111663
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	ED127161	ED128207	ED129610	ED129611	ED130901	ED130903	ED133162	ED133197
	ED133198	ED133199	ED133200	ED134422	ED134423	ED134424	ED134425	ED134426
	ED134462	ED137075	ED141148	ED141149	ED141150	ED141151	ED141152	ED141153
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SECONDARY SCHOOL SCIENCE	(133)	ED028101	ED032236	ED037343	ED045381	ED052607	ED058945	ED058981
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	ED091217	ED093576	ED093694	ED095026	ED096121	ED096128	ED096129	ED096131
	ED096134	ED096135	ED096136	ED096138	ED096141	ED099139	ED100684	ED105104
	ED107519	ED118430	ED119993	ED120348	ED124873	ED124874	ED124878	ED124879
	ED124880	ED124881	ED134461	ED141083	ED141084	ED141085	ED141086	ED141145
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	ED178343	ED178344	ED178345	ED178346	ED178347	ED179352	ED179353	ED179354
	ED179355	ED179356	ED179357	ED179358	ED182172	ED184873	ED184874	ED185247
	ED186282	ED188870	ED189925	ED190356	ED190357	ED190358	ED190359	ED190360

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*SECONDARY SCHOOL STUDENTS	(1)	ED094514
SECONDARY SCHOOL STUDENTS	(3)	ED081193 ED091902 ED093619
SECONDARY SCHOOL TEACHERS	(4)	ED086230* ED107290 ED141499 ED141501
*SEDRO WOOLLEY PROJECT	(1)	ED100777
SEISMOLOGY	(1)	ED084081
SELF CONCEPT	(3)	ED063465 ED100079 ED107777
*SELF HELP PROGRAMS	(1)	ED095026
SELF HELP PROGRAMS	(5)	ED095024 ED095025 ED095027 ED095028 ED095029
SEMICONDUCTOR DEVICES	(1)	ED091215
SENIOR HIGH SCHOOLS	(2)	ED130058 ED141501
*SENSORY EXPERIENCE	(1)	ED071772
SENSORY EXPERIENCE	(1)	ED107513
SENSORY TRAINING	(2)	ED071772 ED195389
SET THEORY	(1)	ED127171
SEX DISCRIMINATION	(1)	ED130058
SEX EDUCATION	(1)	ED062179
*SEX ROLE	(1)	ED130058
*SEX STEREOTYPES	(1)	ED130058
*SHADOWS	(1)	ED103248
*SHIPS	(2)	ED164352 ED164353
SHIPS	(1)	ED141142
SHRUBS	(1)	ED195391
SIGNS	(1)	ED089899
*SIMULATION	(4)	ED089740 ED095017 ED125934 ED126891
SIMULATION	(2)	ED052608 ED129677
*SKILL ANALYSIS	(1)	ED075976
*SKILL DEVELOPMENT	(3)	ED064131 ED136061 ED179402
SKILL DEVELOPMENT	(12)	ED086837 ED112692 ED125934 ED128080 ED128081 ED128082 ED128083 ED128084 ED128085 ED137538 ED141500 ED141532
SKILLS	(1)	ED116995

*SKYLAB EDUCATION PROGRAM	(7)	ED091153 ED091154 ED091157 ED091164 ED091215 ED091216 ED091217
*SLOW LEARNERS	(2)	ED075441 ED096115
SNOW	(1)	ED103249
SOCIAL ADJUSTMENT	(3)	ED101012* ED109849 ED109850
SOCIAL ATTITUDES	(2)	ED080476 ED130058
SOCIAL DEVELOPMENT	(1)	ED079881
*SOCIAL ENVIRONMENT	(1)	ED065362
*SOCIAL FACTORS	(1)	ED080476
SOCIAL FACTORS	(1)	ED065362
SOCIAL RELATIONS	(1)	ED084016
*SOCIAL SCIENCES	(1)	ED188946
SOCIAL SCIENCES	(7)	ED046215 ED082978 ED100777 ED123564 ED164352 ED182107 ED188937
*SOCIAL STUDIES	(14)	ED070766 ED109849 ED133161 ED141142 ED141163 ED142488 ED142489 ED175717 ED179351 ED180801 ED182180 ED183368 ED193048 ED198013
SOCIAL STUDIES	(54)	ED063162 ED075976 ED087912 ED087913 ED087914 ED087915 ED087916 ED089483 ED089740 ED089599 ED091902 ED093673 ED094514 ED100057 ED100061 ED100777 ED101959 ED108875 ED110769 ED111664 ED116995 ED118963 ED125934 ED128244 ED140569 ED141499 ED141500 ED141501 ED141531 ED141532 ED162886 ED162897 ED164348 ED164353 ED173072 ED173163 ED173165 ED174479 ED177012 ED177013 ED177015 ED179374 ED179375 ED180827 ED182107 ED187554 ED187555 ED188946 ED191745 ED193062 ED193063 ED194347* ED194353 ED198014
*SOCIAL STUDIES UNITS	(1)	ED116995
SOCIAL STUDIES UNITS	(12)	ED114466 ED114467 ED114677 ED128080 ED128082 ED128084 ED128085 ED129677 ED134742 ED136061 ED136509 ED137588
SOCIAL VALUES	(1)	ED182135
*SOCIOCULTURAL PATTERNS	(1)	ED162886
*SOCIOECONOMIC INFLUENCES	(1)	ED166013
SOCIOECONOMIC INFLUENCES	(1)	ED011507
*SOIL	(1)	ED103250
SOIL	(1)	ED103244
*SOIL CONSERVATION	(2)	ED067218 ED178339
SOIL CONSERVATION	(2)	ED086502 ED178338
*SOIL SCIENCE	(1)	ED013295
SOIL SCIENCE	(3)	ED042638 ED097214 ED178339
*SOLAR ENERGY	(8)	ED141164 ED173158 ED173159 ED173160 ED173161 ED173162 ED173163 ED173165
SOLAR ENERGY	(1)	ED173164

*SOLAR RADIATION	(17)	ED162851 ED173158 ED173159 ED173160 ED173161 ED173162 ED173163 ED173164 ED173165 ED175716 ED183392 ED184817 ED187557 ED190368 ED190369 ED190370 ED190371
SOLAR RADIATION	(10)	ED159022 ED179395 ED180791 ED180804 ED180805 ED183374 ED184869 ED186281 ED186282 ED194353
SOUTH CAROLINA	(4)	ED093575 ED093576 ED093641 ED134742
*SOUTH DAKOTA	(1)	ED099149
*SPACE	(3)	ED071887 ED077655 ED128244
SPACE CLASSIFICATION	(1)	ED136444
*SPACECRAFT	(1)	ED111611
SPACE ORIENTATION	(1)	ED128244
*SPACE SCIENCES	(13)	ED070674 ED070675 ED091217 ED124393 ED133198 ED133199 ED133200 ED170141 ED178346 ED178347 ED190376 ED190377 ED190378
SPACE SCIENCES	(9)	ED059866 ED083045 ED091216 ED133197 ED188947 ED190368 ED190369 ED190370 ED190371
*SPANISH SPEAKING	(1)	ED087623
SPATIAL RELATIONSHIP	(1)	ED100078
*SPECIAL EDUCATION	(3)	ED088244 ED180814 ED183363
SPECIAL EDUCATION	(1)	ED118758
*SPECTROSCOPY	(2)	ED133197 ED188925
SPELLING	(3)	ED100078 ED140569 ED182107
SPRING	(1)	ED128083
*STARFISH	(1)	ED141152
*STARS	(1)	ED196671
STATE BOARDS OF EDUCATION	(1)	ED100057
*STATE CURRICULUM GUIDES	(4)	ED161752 ED186239 ED186247 ED196699
STATE CURRICULUM GUIDES	(2)	ED123059 ED187573
STATE DEPARTMENTS OF EDUCATION	(2)	ED100057 ED176993
*STATE PROGRAMS	(3)	ED100057 ED179419 ED187573
STATE PROGRAMS	(1)	ED123059
*STATE SCHOOL DISTRICT RELATIONSHIP	(1)	ED180743
*STATE STANDARDS	(1)	ED193080
STATE STANDARDS	(2)	ED176993 ED180743
*STATEWIDE PLANNING	(1)	ED180743
*STATISTICS	(4)	ED190364 ED190365 ED190366 ED190367

*STORY READING	(1)	ED190401
*STREAMS	(1)	ED103251
*STRESS VARIABLES	(1)	ED180134
*STUDENT ATTITUDES	(1)	ED162250
STUDENT ATTITUDES	(3)	ED038726 ED089984 ED142488
*STUDENT BEHAVIOR	(1)	ED038726
STUDENT BEHAVIOR	(4)	ED071264 ED071265 ED071266 ED071267
STUDENT CENTERED CURRICULUM	(1)	ED079138
*STUDENT DEVELOPMENT	(3)	ED134742 ED136061 ED137538
*STUDENT EDUCATIONAL OBJECTIVES	(1)	ED191680
STUDENT ENROLLMENT	(1)	ED114148
*STUDENT EVALUATION	(1)	ED182138
STUDENT EVALUATION	(5)	ED086837 ED096417 ED114466 ED114467 ED178267
*STUDENT INTERESTS	(1)	ED028101
*STUDENT PROJECTS	(6)	ED077655 ED081609 ED081610 ED081611 ED141164 ED142488
STUDENT PROJECTS	(4)	ED063465 ED068366 ED084081 ED142489
*STUDENT RESEARCH	(2)	ED061060 ED077655
STUDENT SCIENCE INTERESTS	(1)	ED077655
*STUDY GUIDES	(9)	ED068366 ED086476 ED086477 ED086478 ED086479 ED086480 ED086553 ED086555 ED098066
STUDY GUIDES	(25)	ED086552 ED086554 ED086556 ED086557 ED091176 ED091177 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512 ED131291 ED131292 ED131293
SUBTRACTION	(1)	ED127179
SUMMER PROGRAMS	(2)	ED184873 ED184874
*SUPERNOVAE	(1)	ED133200
*SUPPLEMENTARY READING MATERIALS	(7)	ED071882 ED071887 ED071892 ED071897 ED071902 ED071907 ED194321
*SUPPLEMENTARY TEXTBOOKS	(1)	ED091215
SURVEYS	(2)	ED046215 ED183363
*SYMMETRY	(1)	ED127175
*SYSTEMS APPROACH	(3)	ED025428 ED127183 ED186282
TABLES (DATA)	(1)	ED114148
*TALENTED STUDENTS	(1)	ED136509

TASK ANALYSIS (2) ED100078 ED100079
*TEACHER AIDES (1) ED089899

TEACHER BEHAVIOR (1) ED120018

*TEACHER DEVELOPED MATERIALS (17) ED040089 ED080332 ED080333 ED080371 ED080372 ED080373 ED080374
ED080375 ED080376 ED080377 ED080378 ED085232# ED118758 ED129677 ED136509
ED140601 ED182181

TEACHER DEVELOPED MATERIALS (52) ED086476 ED086477 ED086478 ED086479 ED086480 ED093690 ED093694
ED095294 ED096117 ED096119 ED096120 ED096121 ED096122 ED096123 ED096124
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ED096149 ED096150 ED096152 ED098066 ED102323 ED106088 ED107513 ED107764
ED107769 ED107777 ED134742 ED136061 ED137558

*TEACHER EDUCATION (2) ED086230# ED104860

TEACHER EDUCATION (2) ED104689 ED191694#

*TEACHER ROLE (1) ED173181

TEACHER ROLE (2) ED112632 ED139522

*TEACHING GUIDES (149) ED013295 ED021745 ED021746 ED042622 ED042645 ED045341 ED045380
ED045381 ED045411 ED046168 ED052000 ED052001 ED052002 ED052003 ED052004
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ED064043 ED064044 ED064131 ED065293 ED067299 ED070588 ED070597 ED071886
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ED075219 ED075221 ED079024 ED079025 ED079026 ED079027 ED079028 ED079029
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ED100079 ED100637 ED100652 ED100653 ED100654 ED100655 ED100656 ED100657
ED100658 ED100662 ED100663 ED100667 ED100697 ED100698 ED101959 ED103237
ED103238 ED103239 ED103250 ED103253 ED106104 ED106375 ED108390 ED111661
ED111664 ED112632 ED118330 ED121613 ED127166 ED127461 ED137075 ED139462
ED139522 ED141142 ED141145 ED141148 ED141149 ED141152 ED141154 ED141156
ED141161 ED141163 ED162596 ED162595 ED178267 ED180772 ED182107 ED182135
ED182180 ED186939 ED186941 ED186944 ED194321 ED195391

TEACHING GUIDES (82) ED022691 ED034676 ED040047 ED040086 ED040087 ED040088 ED042634
ED042635 ED042636 ED042639 ED042640 ED042643 ED046715 ED052307 ED059366
ED067218 ED093687 ED093709 ED094958 ED096113 ED098067 ED098073 ED099188
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ED118418 ED118963 ED128245 ED131294 ED134742 ED141153 ED141158 ED141160
ED141164 ED161727 ED167424 ED180778 ED180893 ED180894 ED180895 ED180898
ED180899 ED180810 ED180813 ED180814 ED184874 ED188929 ED188930 ED188931
ED188932 ED188933 ED188934

*TEACHING LOAD (1) ED114148

*TEACHING METHODS (5) ED123564 ED128245 ED139522 ED191694# ED196699

TEACHING METHODS (25) ED011000 ED070672 ED070673 ED070674 ED077737 ED077738 ED087912
ED087913 ED087914 ED087915 ED087916 ED089036 ED089037 ED089041 ED098098

		ED100079 ED100709 ED100710 ED114523 ED120018 ED125934 ED136509 ED130772 ED180838 ED188947
*TEACHING PROCEDURES	(2)	ED064068 ED068277
TEACHING PROCEDURES	(7)	ED022691 ED063465 ED071896 ED071901 ED071906 ED071911 ED110768
*TEACHING SKILLS	(1)	ED104860
TEACHING STATIONS	(1)	ED108874
*TEACHING TECHNIQUES	(2)	ED082927 ED093700
TEACHING TECHNIQUES	(15)	ED042635 ED083045 ED093619 ED093699 ED120018 ED126891 ED128080 ED128081 ED128082 ED128083 ED128084 ED128085 ED166055 ED167424 ED171570
TECHNICAL EDUCATION	(12)	ED124370 ED124373 ED124374 ED124379 ED124380 ED124381 ED124384 ED124393 ED131292 ED131293 ED131294 ED177014
*TECHNICAL WRITING	(1)	ED178332
*TECHNOLOGICAL ADVANCEMENT	(3)	ED173163 ED173165 ED186282
TECHNOLOGICAL ADVANCEMENT	(8)	ED128294 ED173158 ED173159 ED173160 ED173161 ED173162 ED173164 ED187557
*TECHNOLOGY	(1)	ED166015
TECHNOLOGY	(21)	ED098998 ED111615 ED111616 ED112187 ED119993 ED170141 ED173072 ED173158 ED173159 ED173160 ED173161 ED173162 ED173163 ED173164 ED173165 ED177914 ED180778 ED187554 ED187555 ED187557 ED191680
*TEMPERATURE	(5)	ED131292 ED190379 ED190380 ED190381 ED190382
TEMPERATURE	(2)	ED103238 ED196656
TERRA	(1)	ED107200
*TESTING	(4)	ED071888 ED071893 ED071903 ED071908
TESTING	(2)	ED080361 ED099496
*TEST RELIABILITY	(1)	ED101013
*TESTS	(5)	ED040089 ED071883 ED071898 ED101012* ED178267
TESTS	(3)	ED045341 ED114466 ED114467
TESTS OF SIGNIFICANCE	(1)	ED101013
*TEST VALIDITY	(1)	ED101013
TEXAS	(9)	ED087912 ED087913 ED087914 ED087915 ED087916 ED089036 ED089037 ED089041 ED089043
TEXTBOOK CONTENT	(1)	ED071885
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TEXTBOOKS	(13)	ED096549 ED111611 ED111613 ED111615 ED111617 ED111619 ED111621 ED111623 ED111625 ED111627 ED111631 ED111638 ED127165
THEMATIC APPROACH	(1)	ED063464

*THERMODYNAMICS	(3)	ED071895 ED071896 ED107521
THERMODYNAMICS	(1)	ED071893
*THERMOMETERS	(1)	ED131292
THERMOMETERS	(2)	ED096119 ED131294
THOUGHT PROCESSES	(7)	ED116181 ED128080 ED128081 ED128082 ED128083 ED128084 ED128085
*TIDES	(1)	ED141148
TIDES	(1)	ED141175
TILC COMPUTER SYSTEM	(1)	ED107769
*TIME	(2)	ED095029 ED128244
TIME	(3)	ED071884 ED071885 ED180134
TITLE III	(1)	ED100652
TOPOLOGY	(1)	ED127196
*TOYS	(1)	ED124380
TRADE AND INDUSTRIAL EDUCATION	(18)	ED099496 ED099497 ED099498 ED099499 ED099500 ED099501 ED099502 ED099503 ED099504 ED099505 ED099506 ED099507 ED099508 ED099509 ED099510 ED099511 ED099512 ED137558
*TRAILS	(1)	ED108875
TRAILS	(1)	ED089899
*TRANSECT STUDIES	(1)	ED103253
*TRANSFORMATIONS (MATHEMATICS)	(1)	ED127196
*TRANSPORTATION	(3)	ED128084 ED164352 ED164353
TRANSPORTATION	(2)	ED140601 ED141142
*TREES	(1)	ED195391
TREES	(1)	ED096132*
TREND ANALYSIS	(1)	ED138833
TRIGONOMETRY	(1)	ED081193
TYPEWRITING	(1)	ED136061
UNDERGRADUATE STUDY	(1)	ED175723
UNIFIED SCIENCE	(3)	ED079054 ED079055 ED079056
*UNIFIED STUDIES PROGRAMS	(11)	ED064095 ED064096 ED064097 ED079054 ED079055 ED079056 ED134422 ED134423 ED134424 ED134425 ED134426
UNITED KINGDOM	(1)	ED162250
*UNITED STATES DEPENDENT SCHOOLS EUROPEAN AREA	(2)	ED100078 ED100079

UNITED STATES HISTORY	(2)	ED187555	ED198013					
*UNIT PLAN	(3)	ED093649	ED118782	ED129677				
UNIT PLAN	(22)	ED081609	ED081610	ED081611	ED093593	ED093594	ED093595	ED096417
	ED100079	ED111610	ED111614	ED111616	ED111618	ED111620	ED111622	ED111624
	ED111626	ED111628	ED111629	ED111630	ED111632	ED111639	ED114677	
*UNITS OF STUDY	(8)	ED136509	ED137588	ED141151	ED141155	ED141161	ED141175	ED182172
	ED195391							
UNITS OF STUDY	(21)	ED136061	ED141083	ED141084	ED141085	ED141086	ED141142	ED141145
	ED141148	ED141149	ED141150	ED141152	ED141154	ED141156	ED141158	ED141160
	ED141163	ED141164	ED141531	ED141532	ED188946	ED194321		
*UNITS OF STUDY (SUBJECT FIELDS)	(10)	ED096417	ED114466	ED114467	ED114523	ED119993	ED127169	ED127171
	ED127186	ED128207	ED133162					
UNITS OF STUDY (SUBJECT FIELDS)	(153)	ED013295	ED062177	ED062179	ED064068	ED068310	ED068367	ED068368
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ED 093 658

PFEIFFER, CARL H.
ED 053 945
ED 053 981
ED 053 982

PHARE, WAYNE
ED 045 381

PHELPS, WILLIAM
ED 132 145
ED 132 146

PHILLIPS, JARVIS S.
ED 100 051

PINCK, DAN C.
ED 104 689

PLESS, HERBERT
ED 064 068

PLOTTS, PAUL L.
ED 093 656

POLK, JOYCE
ED 175 716

POST, THOMAS R.
ED 127 165

POSTHUMA, FRED
ED 120 791

POWELL, NANCY A.
ED 139 813

PREMO, JOE
ED 167 409
ED 167 410

PUGSLEY, DAVID C.
ED 079 947

QUINN, KATHY, COMP.
ED 130 653

RAPP, GEORGE, JR.
ED 178 343

RASMUSSEN, RAY S.
ED 090 030

RAWSON, MAC
ED 194 325

REDIN, PAUL
ED 127 193

REED, ELIZABETH W.
ED 127 169
ED 127 172

REEDER, R. P.
ED 096 124

REESE, SANDRA KAY
ED 090 029

REIHER, JOHN F.
ED 123 059

REIL, GABRIELE
ED 179 357

REILLY, DENNIS
ED 123 055

REINARD, WILLIAM
ED 160 777

REINHARD, DIANA HEREDA
ED 091 233

REISTER, W. A.
ED 096 122

REPASS, SUSAN O.
ED 132 044

REYNARD, DALE C.
ED 093 656

RHODEN, BRUCE
ED 089 332
ED 089 333
ED 095 024
ED 095 025
ED 095 026
ED 095 027

RICHASON, , BENJAMIN F., JR.
ED 123 245

RICKER, KENNETH S.
ED 191 666

RIEFF, MARILYN
ED 127 173
ED 127 180

RIES, WESLEY G.
ED 093 659

RILLO, THOMAS J.
ED 082 927

RING, DONALD G.
ED 106 105

ROBINSON, JAMES T.
ED 089 981

ROGERS, ARNOLD R., ED.
ED 077 737
ED 077 738
ED 085 502

ROLLER, LIB
ED 089 899

ROMEY, WILLIAM D.
ED 178 342

ROSS, CATHERINE
ED 133 146

SABBATH, LARRY
ED 174 475

SAGNESS, REBECCA L.
ED 162 895

SAGNESS, RICHARD L.
ED 162 895
ED 178 336
ED 178 307

SAMPH, THOMAS
ED 101 013

SANDERSON, ROBERT C.
ED 079 026
ED 093 622

SAUNDERS, JOHN L.
ED 101 012

SAVLER, D. S.
ED 111 615

SAYLES, FELTON
ED 101 013

SCHATZ, DENNIS
ED 184 875

SCHLENKER, RICHARD M.
ED 123 207
ED 178 332

SCHMALHOFER, ED
ED 093 690

SCHMIDT, JOAN S.
ED 191 783

[illegible]ER, RONALD L.
ED [illegible] 097

[illegible], ROBERT
ED [illegible] 087

[illegible]LER, WILLIAM J.
ED 127 178

[illegible], DARLENE
ED 19[illegible] 050

[illegible]ER, C. M.
ED 099 149

[illegible]TZ, JONATHAN R.
ED 134 [illegible]

SCOTT, ARTHUR
ED 022 690
ED 022 691

SEAGER, DOUG
ED 195 656

SEGERSTROM, HAROLD G.
ED 052 067

SHEFFIELD, SHARON
ED 189 903

[illegible]ER, VICTOR
ED 023 456

SIDEY, D.
ED 165 055

SILVER, BARBARA A.
ED 079 024
ED 079 134

SISK, DIANE
ED [illegible] 128
ED [illegible] 129

SMITH, [illegible]. C.
ED 111 627

SMITH, STEPHEN M., ED.
ED 111 664

[illegible], BEVERLY, ED.
ED 127 190
ED 127 194

[illegible]L, WILLIAM
ED [illegible] 120
ED [illegible] 133
ED 096 123

SOLIS, JUAN D.
ED 067 623

SORENSEN, BOBBI, ED.
ED 140 601

SPENCER, RONALD D.
ED 035 230

STAPLETON, RICHARD J.
ED [illegible]

STEPHEY, MERLE
ED 189 791

STERLING, VICKI
ED [illegible]

STETTLER, DONALD
ED 096 121

STONE, LAURIE
ED 171 570

STOWELL, E. D., JR.
ED 096 152

STRAKA, W. C.
ED 133 [illegible]0

STRANIX, EDWARD L.
ED 142 488
ED 142 489

STRENGER, JOHN
ED 107 769

SULLIVAN, N. A.
ED 096 135

SWARTZ, LINDA
ED 180 812

SWINTON, OLIVIA
ED 182 180

TANNER, R. THOMAS
ED 099 188
ED 099 189

TERRY, MARK
ED 137 075

THELEN, JUDITH
ED 1[illegible] 131

THOMPSON, BEN, ED.
ED 196 721

THOMPSON, LOWELL
ED 193 074

THOMPSON, MALCOLM
ED 040 047

THOMSON, POLLY V.
ED 127 177

TRIEGER, SEYMOUR
ED 021 746

TRUSSELL, GALE
ED 194 325

TULLOCK, BRUCE, ED.
ED 173 158
ED 173 159
ED 173 160
ED 173 161
ED 173 162
ED 173 163
ED 173 164
ED 173 165

TURKEL, TUX
ED 184 369

TURKINGTON, B. A.
ED 096 149

VALENTI, CHRISTOPHER
ED 193 020

VAN DEVENTER, WILLIAM C.
ED 040 036
ED 040 037
ED 040 038
ED 040 039

VERDUIN, JACOB
ED 173 345

VISICH, MARIAN, JR.
ED 089 740

VOGT, ELAINE E., ED.
ED 127 189
ED 127 187
ED 127 191

WALBESSER, HENRY H.
ED 059 900

WARNER, JEANETTE V., COMP.
ED 071 772

WARREN, MARK
ED 195 389

WATT, DANIEL H.
ED 196 660

WEAVER, ELBERT C.
ED 030 359

WEBSTER, DAVID
ED 195 661

WEEDEN, KENNETH P.
ED 179 375

WEISS, ALAN
ED 079 030
ED 092 356

WHEELER, ELAINE
ED 096 115

WHITLA, DEAN K.
ED 164 689

WICKENS, DAVID L., ED.
ED 189 743

WIELAND, ANNE
ED 183 929
ED 183 930
ED 183 931
ED 183 932
ED 183 933
ED 183 934

WILKERSON, PEGGY
ED 123 081

WILLIAMS, G. J.
ED 086 476
ED 086 477
ED 086 478
ED 098 066

WILLIAMS, LAVORA
ED 175 717
ED 175 718

WILLIAMS, RUSSELL R.
ED 086 523

WINNEN, CHARLOTTE
ED 107 769

WITT, PAUL
ED 137 075

WOODBURN, JOHN H.
ED 196 104

WOOLEVER, JAMES
ED 104 874

WORTHINGTON, CHARLES
ED 079 025

WYATT, STANLEY P., JR.
ED 196 668
ED 196 669
ED 196 670
ED 196 671

ZAITLIN, SAMUEL
ED 175 723

ZUPFER, JOHN
ED 120 348